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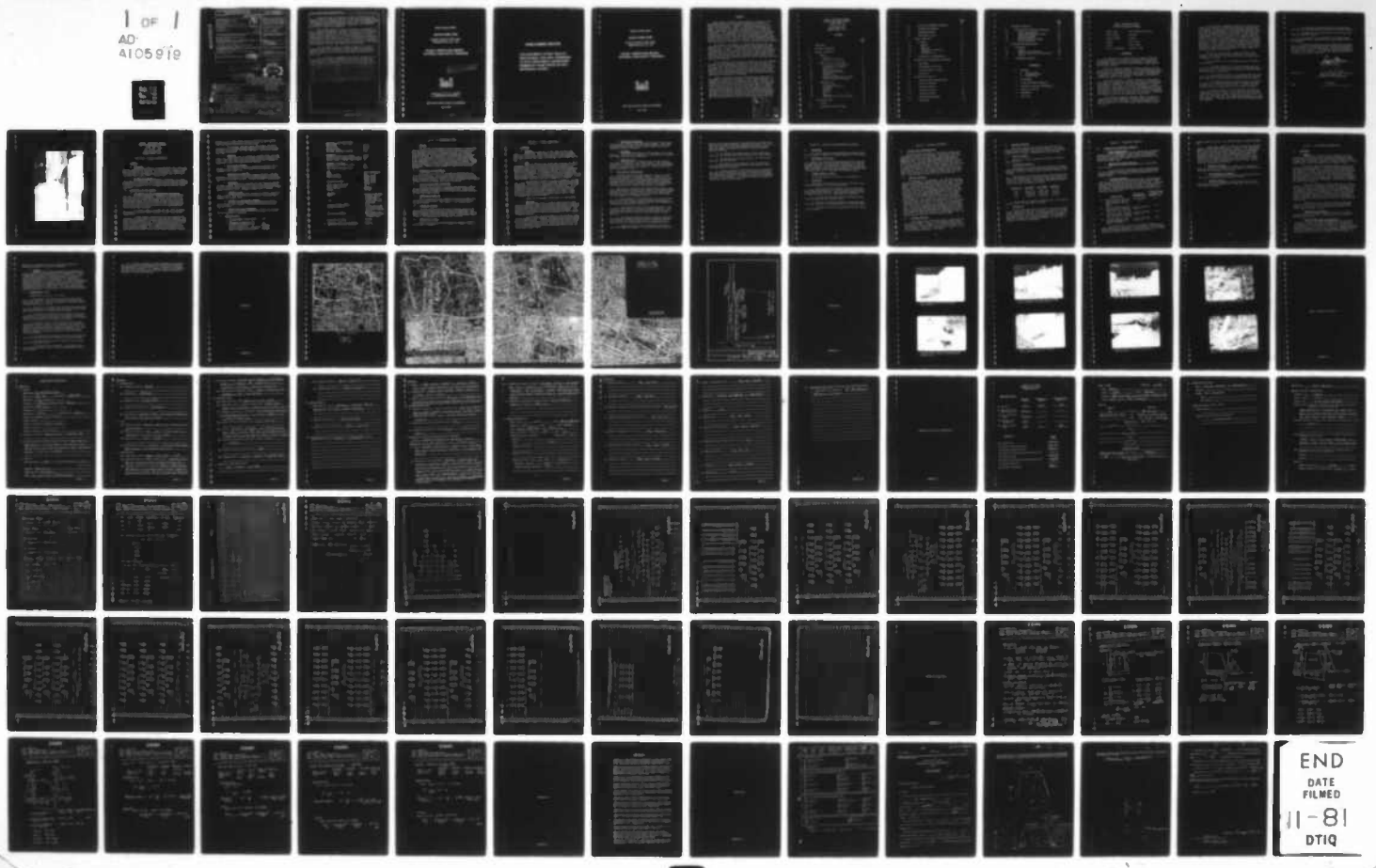

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South Pond Dam
Nassau County
Long Island Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The examination of documents and the visual inspection of South Pond Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigations and remedial actions.

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National Dam Safety Program. South Pond Dam (Inventory Number NY. 109), Long Island Basin, Nassau County, New York. Phase I Inspection Report,

Using the Corps of Engineers screening criteria for the initial review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 3.0 percent of the Probable Maximum Flood (PMF). The spillway is therefore adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard for loss of life downstream from the dam.

The structural stability analysis based on available information and visual inspection indicates that the stability against sliding and overturning of the spillway section of the dam is inadequate for all cases except Normal Loading without Ice Load.

It is therefore recommended that within 3 months of notification to the owner, a detailed hydrological and hydraulic investigation be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. At the same time, a structural stability study of the spillway section should be performed as detailed in Section 6.1c. Within twelve (12) months of the date of notification to the owner, any modification to the structure deemed necessary as a result of investigations, to achieve a spillway capacity adequate to discharge the outflow from at least one-half (1/2) PMF, should have been completed. In the interim, a detailed emergency action plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

LONG ISLAND BASIN

SOUTH POND DAM

NASSAU COUNTY, NEW YORK
INVENTORY NO. N.Y. 109

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NEW YORK DISTRICT CORPS OF ENGINEERS

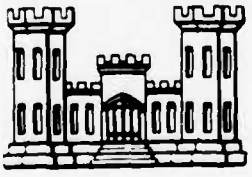
JULY 1981

LONG ISLAND BASIN

SOUTH POND DAM

NASSAU COUNTY, NEW YORK
INVENTORY NO. N.Y. 109

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C., 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SOUTH POND DAM
I.D. NO. N.Y. 109
D.E.C. NO. 192
LONG ISLAND BASIN
NASSAU COUNTY, N.Y.

CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM	South Pond Dam, NY 109
STATE LOCATED	New York
COUNTY LOCATED	Nassau
STREAM	Mill River
BASIN	Long Island
DATE OF INSPECTION	March 13, 1981

ASSESSMENT

The examination of documents and the visual inspection of South Pond Dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigations and remedial actions.

Using the Corps of Engineers screening criteria for the initial review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 3.0 percent of the Probable Maximum Flood (PMF). The spillway is therefore adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard for loss of life downstream from the dam.

The structural stability analysis based on available information and visual inspection indicates that the stability against sliding and overturning of the spillway section of the dam is inadequate for all cases except Normal Loading without Ice Load.

It is therefore recommended that within 3 months of notification to the owner, a detailed hydrological and hydraulic investigation be undertaken to more accurately determine the site specific characteristics of the watershed and their affect upon the overtopping potential of the dam. At the same time, a structural stability study of the spillway section should be performed as detailed in Section 6.1c. Within twelve (12) months of the date of notification to the owner, any modification to the structure deemed necessary as a result of investigations, to achieve a spillway capacity adequate to discharge the outflow from at least one-half (1/2) PMF, should have been completed. In the interim, a detailed emergency action plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around-the-clock surveillance should be provided.

In addition, the dam has a number of problem areas which, if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within twelve (12) months.

The following are the recommended measures which must be corrected:

1. The seepage near the toe of the dam about 50 feet left of the spillway should be investigated to determine the source and cause. The appropriate methods of correction should be identified and carried out.

2. The continued erosion of the upstream face and crest of the dam should be prevented by re-establishing the original crest width and upstream slope and protecting them by riprap.

3. The seepage through the masonry joints in the spillway should be controlled and monitored at biweekly intervals with the aid of collectors and/or weirs. The source of the seepage should be investigated and if warranted corrected.

4. Clean all brush, saplings and debris from the upstream and downstream slopes. All coniferous trees should be removed while larger hardwood trees should not be removed but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be monitored for possible seepage. A program of periodic cutting and mowing should be provided.

5. The upstream and downstream low level inlets and outlets at the spillway should be cleaned out and made operable.

6. The approach and tailrace channels of the spillway should be cleared of debris.

7. The capacity and arrangement of the outlet works and auxiliary spillway located near the right abutment should be confirmed.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the repaired gates. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.

Eugene O'Brien, P.E.
New York No. 29823

Approved by:

Col. W.M. Smith, Jr.
New York District Engineer

Date: 05 AUG 1981

1. OVERVIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SOUTH POND DAM
I.D. NO. N.Y. 109
D.E.C. NO. 192
LONG ISLAND BASIN
NASSAU COUNTY, N.Y.

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers by Contract No. DACW 51-81-C-0008 dated 14 December 1980 in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367, 8 August 1972.

b. Purpose of Inspection

The inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF THE PROJECT

a. Description of Dam and Appurtenant Structures

The South Pond Dam is composed of an approximately 800 foot long earth embankment. The crest of the dam is 10 feet wide and its maximum height above the river is 13 feet. The upstream face of the dam appears to have been paved with stone and the upper part of the upstream face has a slope of 1V:3H, while the lower has a slope of 1V:4H. The downstream face of the dam has a slope of 1V:3H on the upper part and 1V:2H on the lower sections.

An intake tower is located near the right abutment. The size of the inlets and/or outlets, if any, could not be ascertained.

A stone masonry uncontrolled overflow weir service spillway is located about 250 feet from the left abutment. The crest of the spillway is 3.5 feet below the top of the dam and has an opening 25 feet wide. The spillway has sloping training walls 21 feet long which form an upstream approach channel. These walls are equipped with stoplog slots to allow closure of the spillway opening. Also included in these walls near the base are two controlled low level bypass conduits (approxi-

mately 9 x 12 inches) built within the training walls which exit through the downstream training walls.

An auxiliary spillway which exits about 150 feet downstream in a stepped channel appears to be part of the outlet works located near the right abutment. The intake arrangement was not visible.

b. Location

South Pond Dam is located on the Mill River in Hempstead Lake State Park near the Village of Rockville Centre, New York. Lake View Avenue near its intersection with Peninsula Boulevard, passes just downstream of the dam.

c. Size Classification

The dam is 13 feet high and has a reservoir with a maximum storage capacity of 187 acre-feet and therefore is classified as a small dam.

d. Hazard Classification

The dam is in the "high" hazard potential category because of its location within a developed suburban area, and the close downstream proximity of major highways and residences.

e. Ownership

South Pond Dam is owned by the New York City Bureau of Water Supply. The person to contact is Mr. Edward Conway, Acting Borough Engineer, Queens at 119-45 Union Turnpike, Forest Hills, New York, 11375, Telephone Number (212) 520-3467.

f. Purpose of Dam

The dam impounds water as part of the New York City Water Supply. The water has not been used for this purpose, however, in several years.

g. Design and Construction History

The dam was designed and constructed in 1903 for the Brooklyn Water Company. The designer and constructors are not known.

h. Normal Operating Procedures

There is no normal operating procedure nor records of past operating procedures.

1.3 PERTINENT DATA

a. Drainage Area, Square Miles	16.0
b. Discharge at Damsite, cfs	
Ungated Overflow Spillway	600
Auxiliary Spillway	Unknown
Maximum Capacity 5 x 6 Aqueduct	Unknown
Total Discharge Maximum Pool	Unknown

c.	Elevation, Feet Above MSL, USGS Datum	
	Top of Dam	15.75
	Maximum Pool	15.75
	Spillway Crest	12.0
	Spillway Low Level Outlets	4.0
d.	Reservoir	
	Length of Normal Pool (Feet)	1500
	Surface Area of Maximum Pool(acres)	23.5
	Surface Area of Normal Pool(acres)	21
e.	Storage, Acre-Feet	
	Reservoir at Spillway Crest (El. 12.0)	83
	Reservoir at Maximum Pool	187
f.	Dam	
	Type	Earth Embankment
	Length (Feet)	800
	Upstream Slope	Stone Paved Upper 1V:3H Lower 1V:4H
	Downstream Slope	Upper 1V:2H Lower 1V:2H
	Crest Elevation (MSL)	15.75
	Crest Width (Feet)	10
	Grout Curtain	Unknown
	Cutoff	Unknown
g.	Spillway	
	Type	Uncontrolled Stone Masonry, Broad-Crested Weir
	Size	25 feet wide, 3.5 feet below crest elevation
	Crest Elevation (MSL)	12.0
	Upstream Channel	21 feet long x 25 feet wide formed by sloping training walls
	Downstream Channel	Open channel with downstream sloping training walls
	Auxiliary Spillway	Unknown
h.	Reservoir Drain and Pipelines	Unknown

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

The records of the owner contain no data on site geology. However, there is data available in the literature on the general geology of the area. The South Pond Dam is located in the northeast portion of the Atlantic Coastal Plain Physiographic Province. This province is characterized by sediments which lack a definite coherence. The area around South Pond Dam is characteristic of the south shore of Long Island exhibiting topography of very low relief consisting of glacial outwash plain sediments of clayey sand, sand and gravel deposits. These Quaternary deposits overlie the Magothy Formation of the Upper Cretaceous. These are also primarily clayey sand, sand and gravel.

2.2 SUBSURFACE INVESTIGATIONS

There are no records of subsurface investigations carried out at the site. It is known that the surficial soils in the vicinity of South Pond Dam are glacial outwash plain clayey sands, sands and gravels. There are also some recent fine-grained alluvial sediments present just south of the dam.

2.3 DAM AND APPURTENANT STRUCTURES

There are no records or drawings available with regard to the original construction of the dam in 1901. There are however drawings available in the records of the owner relating to the water supply system.

2.4 CONSTRUCTION RECORDS

No information has been located in relation to the construction of the project. The name(s) of the contractor(s) is (are) unknown.

2.5 OPERATION RECORDS

In recent years there has been no regular operation of the dam and no records are kept of reservoir operation. The dam is reportedly monitored and routine surrounding park maintenance is carried out by the NYSDEC, LISPC. No systematic monitoring of the performance of the dam is in effect.

2.6 EVALUATION OF DATA

There is sufficient data available to support a Phase I evaluation of the dam.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of the South Pond Dam was made on 13 March 1981. The weather was clear and the temperature was in the low fifties. At the time of the inspection, the lake level was just below the spillway crest of about El 11.5 MSL.

b. Dam

Both the upstream and downstream slopes of the earth embankment are heavily overgrown with trees and shrubs. The upstream slope of the dam was once covered by stone paving which has broken away, resulting in the exposure and subsequent erosion of the underlying granular material. The erosion has led to local sloughing and subsidence along the upstream face which is continuing. The horizontal and vertical alignment of the crest appears to be good with the exception of a slightly irregular upstream edge resulting from local sloughing and erosion.

The downstream slope of the dam is somewhat irregular due to the close proximity of the adjacent Lakeview Avenue road embankment. A wet area is located at a low point near the downstream toe about 50 feet to the left of the spillway. It was not possible to determine whether the wet area is caused by seepage or surface runoff which appears to collect at this point from various directions. The flow rate (about 5 gpm) and the clarity of the flow indicates however that it might be seepage flow (see PHOTOGRAPH 9).

There is no emergency action plan for the project.

c. Spillway

The spillway which is located about 250 feet from the left abutment suffers from a lack of maintenance. There is seepage through the masonry at various places in the downstream face and near the base of the downstream training walls. The upstream and downstream channel are clogged with debris. Two small low level gated outlets are inoperable and their intakes clogged by debris.

An auxiliary spillway appears to be included as part of the reservoir outlet system. A stepped spillway outlet channel is located south of Lakeview Avenue near the right abutment of the dam. This appears to be connected to the outlet works on the upstream face of the dam. The relationship of the intake to the outlet could not be ascertained and the owner has no record of this outlet.

d. Outlets and Pipelines

The intake for the outlet which feeds the New York City Aqueduct is located near the right abutment. The intake system and aqueduct has not been used for many years and is inoperable and full of debris.

e. Abutments

The abutment/dam contacts and abutments are in good condition. There does not appear to be any portion of the abutment lower than the crest of the dam.

f. Reservoir Area

The reservoir is located within the park closely surrounded by residential areas and highways. The surrounding topography is relatively flat. There are neither slides, rockfalls or sloughing around the reservoir. There were no sedimentation problems visible.

3.2 EVALUATION OF OBSERVATIONS

Although deficiencies were observed, there is no indication that the dam is in imminent danger. A number of the deficiencies observed in the previous paragraphs are minor and can be corrected by increased maintenance. Other conditions described above, however, represent conditions which may have potential for further deterioration and for this reason these conditions need to be further investigated or corrected.

Significant conditions were observed which require immediate investigation to determine the extent of corrective action necessary to insure the stability of the dam and appurtenances. The following is a summary of the problem areas encountered, with the appropriate recommended action:

1. There appears to be seepage near the toe of the dam about 50 feet left of the spillway requiring investigation. The source of this seepage should be identified and appropriate corrections determined and carried out.

2. The continued erosion of the upstream face, if not corrected, could lead to an unsafe, unstable condition. The upstream slope therefore should be re-established to its original condition and protected by riprap to prevent further erosion.

3. The seepage through the masonry joints in the spillway should be controlled and monitored at biweekly intervals with the aid of collectors and/or weirs. The source of the seepage should be investigated and if warranted corrected.

4. Clean all brush, saplings and debris from the upstream and downstream slopes. All coniferous trees should be

removed while larger hardwood trees should not be removed, but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be monitored for possible seepage. A program of periodic cutting and mowing should be provided.

5. The upstream and downstream low level inlets and outlets at the spillway should be cleaned out and made operable.

6. The approach and tailrace channels of the spillway should be cleared of debris.

7. The capacity and arrangement of the outlet works and auxiliary spillway located near the right abutment should be investigated and confirmed.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the repaired gates. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. There is no normal operation of the project.

4.2 MAINTENANCE OF THE DAM

There is no regular maintenance schedule for the dam. The responsibility for day-to-day maintenance of the dam reportedly belongs to the Park Staff. Maintenance is not considered adequate as evidenced by the erosion of the upstream face of the dam, condition of the spillway and extensive tree and brush growth on the upstream and downstream faces.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall maintenance of the South Pond Dam is considered inadequate in the following areas:

1. Stone paving, once present on the upstream face, has broken away along most of the dam resulting in erosion of the underlying material. This erosion is continuing and ultimately results in local subsidence and sloughing.

2. The spillway exhibits extensive seepage through the downstream face and training walls.

3. Control of trees and vegetation on the upstream face, the crest and the downstream face is completely absent.

4. No formal operation and maintenance manual exists for the project.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

South Pond Dam is located on the Schodack Brook, north of Rockville Centre in Nassau County, Long Island, New York (Hydrologic Unit Code No. 02030202). The dam and pond is in Hempstead Lake State Park and is immediately downstream of Hempstead Lake. Flow from Hempstead Lake discharges into South Pond. The drainage area contributing directly to South Pond is 1.06 square miles and is almost entirely urbanized. It is estimated that 32 percent of the drainage area is covered by impervious materials (roads, houses, parking lots, etc.). The basin is relatively flat with a length to width ratio of approximately 6 to 1, with a highly permeable surficial sandy soil. The influence of storm-sewers in the basin is unknown but has been assumed to drain into the stream channel.

5.2 ANALYSIS CRITERIA

The analysis of the adequacy of the spillway was performed by developing a design flood, using the unit hyrograph method and the Probable Maximum Precipitation (PMP). The all season, 200 square mile 24 hours, PMP for the Hempstead area (Zone 6) taken from Weather Bureau sources, was 23 inches. The drainage basin was divided into two sub-areas for this analysis. Run-off from the Hempstead Lake sub-area was computed using the unit hydrograph developed for the adjacent 10 square mile East Meadow Brook basin. This unit graph, transposed to the smaller South Pond sub-area, produced coefficients of 2.05 = C_T and 450 = 640 C_P for the Snyder unit hydrograph. Loss rates of 2.2 inches initial and 0.24 inches/hour were estimated inaccordance with U.S.G.S. Professional Paper 627-F (Ref. -1) to reflect the high infiltration capacity of the pervious soils found in the Hempstead area. The inflow hydrograph was developed by the U.S. Army Corps of Engineers HEC-1DB computer program and the inflow from the South Pond drainage area was combined wtih outflow from Hempstead Lake and resulted in a peak PMF inflow of 16,700 cfs. A multi-plan analysis was performed to test the spillway under the full, 0.75, 0.50 and 0.25 PMF.

5.3 SPILLWAY CAPACITY

The ungated concrete spillway, with a crest elevation of 12.0 feet (MSL), is 24.75 feet in length, with vertical wingwalls 3.75 feet in height. The computed maximum spillway discharge, with the pond level at El 15.75 feet (top of dam elevation), is 600 cfs. The additional capacity, if any of the auxiliary spillway is not known.

5.4 RESERVOIR CAPACITY

The normal capacity of the South Pond Reservoir is listed as 82.6 acre-feet (26.9 million gallons). Surcharge storage between spillway crest elevation (12.0 feet) and top of dam (El. 15.75 feet) is computed to be 104 acre-feet.

5.5 FLOODS OF RECORD

There are no records available of floods or maximum lake elevations.

5.6 OVERTOPPING POTENTIAL

The potential of the dam being overtopped was investigated on the basis of the spillway discharge capacity and the available surcharge storage to meet the selected design flood inflows.

The analysis was performed assuming that the water surface in the reservoir was at spillway crest elevation at the start of the flood event. The computed PMF peak outflow was 16,900 cfs. The routing of the inflow hydrographs resulted in the dam being overtopped as follows:

RATIO OF PMF	PEAK INFLOW	PEAK OUTFLOW	OVERTOPPING
1.00	16,670 cfs	16,900 cfs	3.37 ft.
0.75	12,490 cfs	12,260 cfs	2.68 ft.
0.50	8,260 cfs	8,520 cfs	2.06 ft.
0.25	3,900 cfs	3,890 cfs	1.13 ft.

The spillway is capable of passing only 3.6 percent of the PMF without the dam being overtopped.

5.7 EVAULALTION

The principal spillway of the South Pond Dam has insufficient capacity to pass either the PMF or one-half (1/2) PMF without overtopping the dam. The overtopping of the dam could cause the failure of the dam, thus significantly increasing the hazard for the loss of life downstream. The spillway is therefore assessed as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not indicate any structural problems with the embankment or appurtenant structures with the reservoir at its present level. There are no adverse conditions observable which would affect the stability of the dam at the present time.

b. Design and Construction Data

There are no design calculations or construction data available.

On the basis of performance, visual inspection, as well as engineering judgment, the embankment and appurtenant structures appear to be adequate with the reservoir at its present level.

c. Stability Analysis

As there were no drawings available, the structural stability of the masonry spillway section was analyzed based on an assumed typical section and field measurements. Stability analysis, for the spillway section was done in accordance with the Corps of Engineers Recommended Guidelines. (Reference 3) The following table shows the loading cases considered and the results of the analysis.

	Loading Case	Overturning (See Appendix E)	Sliding Factor of Safety (See Appendix E)
I)	Normal Loading condition with reservoir level at Spillway Crest, No Ice Load	Inside Middle 1/3	4.3
II)	Normal Loading condition with reservoir at Spillway Crest, with Ice Load	3.93 ft. Outside Middle 1/3	1.47
III)	Unusual Loading; One-half (1/2) PMF, water overtopping the dam by 2.18 feet	1.63 ft. Outside Middle 1/3	2.61
IV)	Extreme Loading: PMF - water overtopping the dam by 3.34 feet	2.93 ft. Outside Middle 1/3	2.12

On the basis of the structural stability analysis performed during the investigation, the stability of the spillway against overturning and sliding was determined to be inadequate for Case II, Normal Loading with Ice Load, Case III,

Unusual Loading; One-half (1/2) PMF and Case IV, Extreme Loading: PMF.

Since exact geometry, foundation conditions, upstream backfill characteristics and extent, as well as the extent and magnitude of the uplift pressure are unknown, it is recommended that a more detailed structural stability study be performed. The study should include field investigations to obtain more information regarding the extend and characteristics of the backfill and foundation materials, as well as the quality and condition of the observable masonry of the structure. Based on the results of the analysis, modifications to the spillway should be recommended as required.

d. Operating Records

There are no operating records kept or available. There are no records or reports or any operation problems which would effect the stability of the dam.

e. Post-Construction Changes

It is reported that the dam was constructed in 1901. There are no reported post-construction changes.

f. Seismic Stability

The dam is located in Seismic Risk Zone 1 and in accordance with recommended Phase I guidelines, does not warrant seismic analyses.

SECTION 7 - ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Examination of the available documents and visual inspections of the South Pond Dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some deficiencies which require further investigation and remedial action.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the dam would be overtopped for all storms exceeding approximately 3.0 percent of the PMF. The overtopping of the dam could cause the erosion of both abutments and the downstream face of the dam, particularly in the vicinity of the spillway-embankment contact resulting in dam failure, thus significantly increasing the hazard for loss of life downstream. The spillway is therefore adjudged as "seriously inadequate" and the dam is assessed as unsafe, non-emergency.

The classification of "unsafe" applied to a dam because of a "seriously inadequate" spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam would take place, significantly increasing the hazard to loss of life downstream from the dam.

The results of the stability analysis indicates that the stability of the spillway against overturning and sliding are inadequate for all loading cases except Case I - Normal Loading without Ice Load.

b. Adequacy of Information

The information and data available were adequate for performance of a Phase I inspection, except as noted in Section 6.1c and 6.1d.

c. Need for Additional Investigations

Since the spillway is considered to be "seriously inadequate", additional hydrologic/hydraulic investigations are required to more accurately determine the site specific characteristics of the watershed. After the in-depth hydrologic/hydraulic investigations have been completed, remedial measures must be initiated to provide spillway capacity sufficient to discharge the outflow from the one-half (1/2) PMF event. In

addition, an investigation of the structural stability of the spillway portion of the dam is required.

d. Urgency

The additional hydrologic/hydraulic investigations and the stability investigation which are required must be initiated within 3 months from the date of notification. Within 12 months of notification, remedial measures as a result of these investigations must be initiated, with completion of these measures during the following year. In the interim, develop an emergency action plan for the notification of downstream residents and proper governmental authorities in the event of overtopping and provide around-the-clock surveillance of the dam during periods of extreme runoff. The other problem areas listed below must be corrected within one year from notification.

7.2 RECOMMENDED MEASURES

Recommended measures are as follows:

1. The seepage near the toe of the dam about 50 feet left of the spillway should be investigated to determine the source and cause. The appropriate methods of correction should be identified and carried out.

2. The continued erosion of the upstream face and crest should be prevented by re-establishing the original crest width and upstream slope and protecting them by riprap.

3. The seepage through the masonry joints in the spillway should be controlled and monitored at biweekly intervals with the aid of collectors and weirs. The source of the seepage should be investigated and if warranted corrected.

4. Clean all brush, saplings and debris from the upstream and downstream slopes. All coniferous trees should be removed while larger hardwood trees should not be removed, but should be inventoried and their condition monitored. If a tree dies, the area around the tree should then be monitored for possible seepage. A program of periodic cutting and mowing should be provided.

5. The upstream and downstream low level inlets and outlets at the spillway should be cleaned out and made operable.

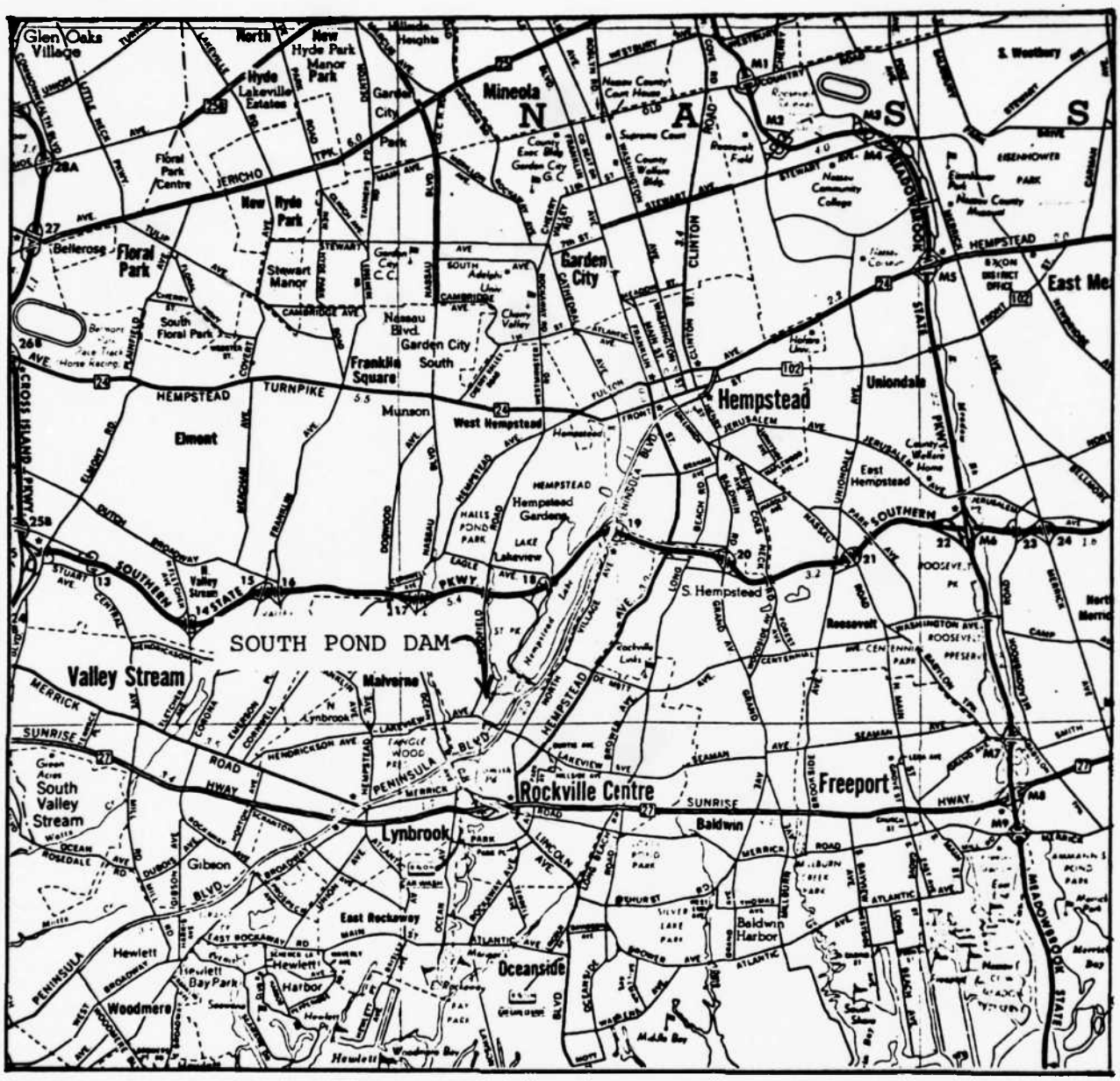
6. The approach and tailrace channels of the spillway should be cleared of debris.

7. The capacity and arrangement of the outlet works and auxiliary spillway located near the right abutment should be confirmed.

8. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the repaired gates. Document this information for future reference. The emergency action plan described in Section 7.1d should be maintained and updated periodically during the life of the structure.

DRAWINGS

APPENDIX A

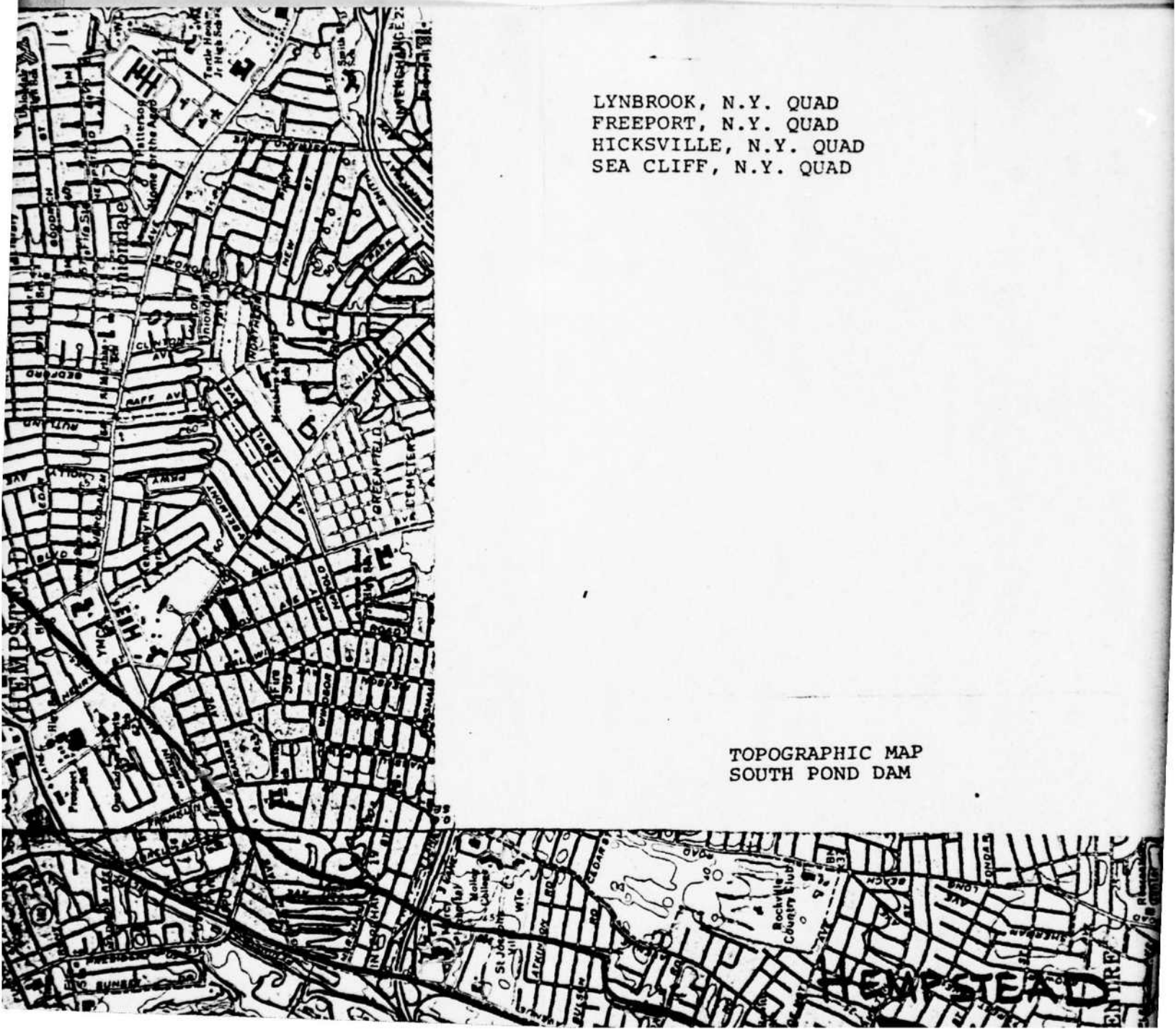


Scale 1" = 1.3 miles

SOUTH POND
DAM
VICINITY MAP

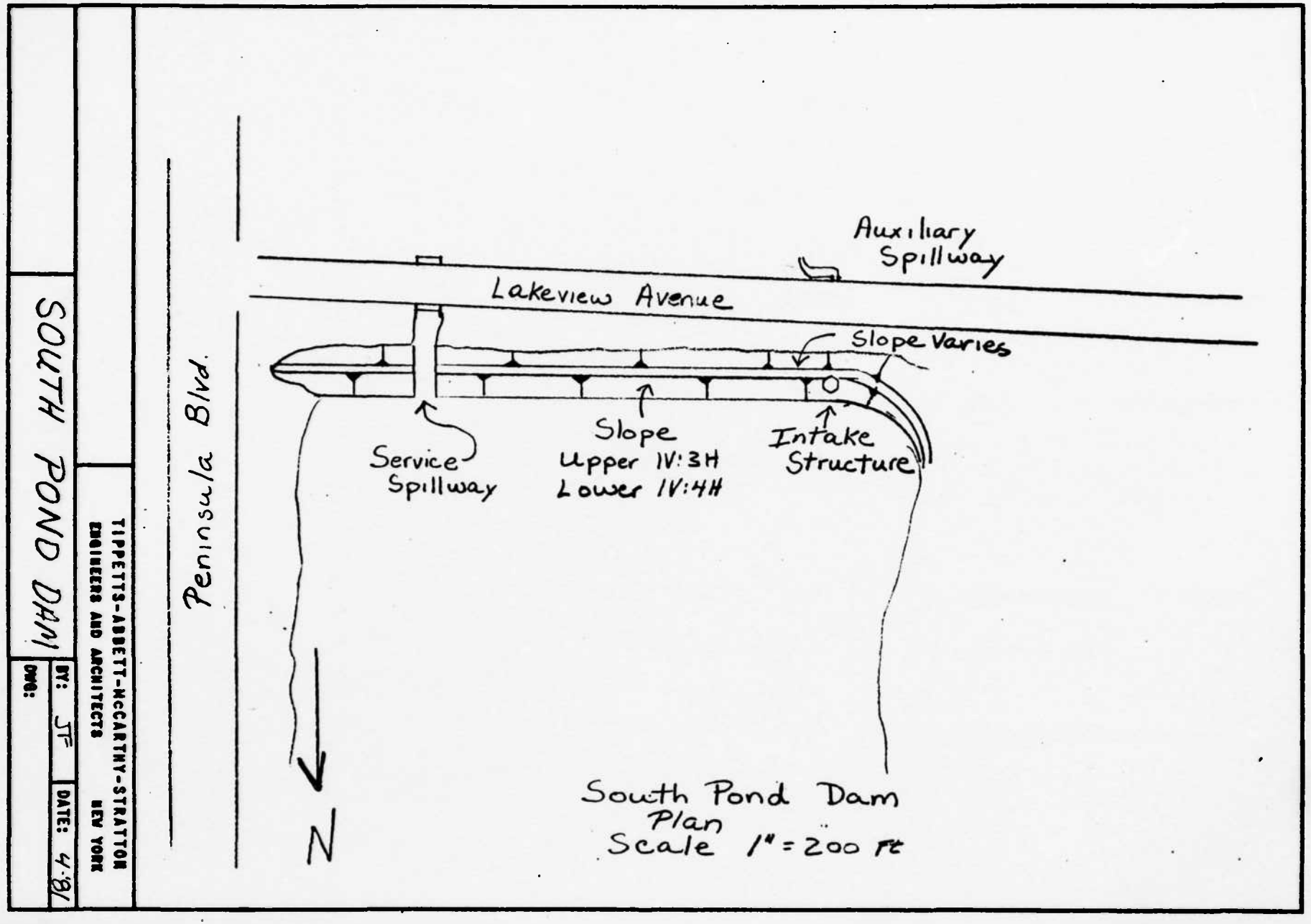

HEMPSTEAD LK. DAM
DRAINAGE
BASIN
Old Westbury
Old Westbury Country Club
EAST HILLS
Wheatley
INTERCHANGE 39
INTERCHANGE 38
INTERCHANGE 32
Pumping Sta
Hofstra University Old Westbury Campus
NORTH HEMPSTEAD
Westbury Temple
Westbury High Sch
Wheatley Sch
Willets Road Sch
Albertson
WILLETS ROAD
HITCHCOCK LANE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 MILE


Carle Place
MINEOLA
WESTBURY
NORTH HEMPSTEAD
GARDEN CITY
INTERCHANGE M1
INTERCHANGE M2
INTERCHANGE M3
INTERCHANGE M4
INTERCHANGE M6
Roosevelt Field Shopping Center
Roosevelt Raceway
Water Tank
Radio Tower
NASSAU COMMUNITY COLLEGE
Abandoned Airport
Sewage Disposal Ponds
Army Reserve
Holy Rood Cemetery
Meadowbrook Pkwy
Northern State Pkwy
Long Island Expressway



LYNBROOK, N.Y. QUAD
FREEPORT, N.Y. QUAD
HICKSVILLE, N.Y. QUAD
SEA CLIFF, N.Y. QUAD

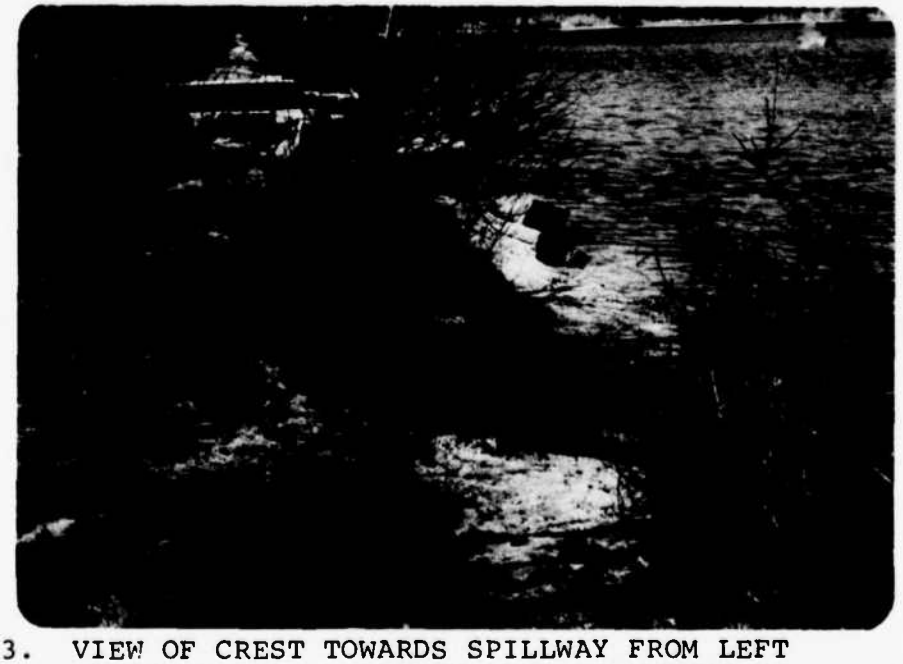
TOPOGRAPHIC MAP
SOUTH POND DAM


Auxiliary Spillway
Lakeview Avenue
Slope Varies
Peninsula Blvd.
Service Spillway
Slope
Upper 1V:3H
Lower 1V:4H
Intake Structure
N
South Pond Dam
Plan
Scale 1" = 200 ft
SOUTH POND DAM
TIPPETTS-ABBETT-McCARTHY-STRATTON
ENGINEERS AND ARCHITECTS
NEW YORK
BY: JF
DATE: 4-81
DWG:

PHOTOGRAPHS

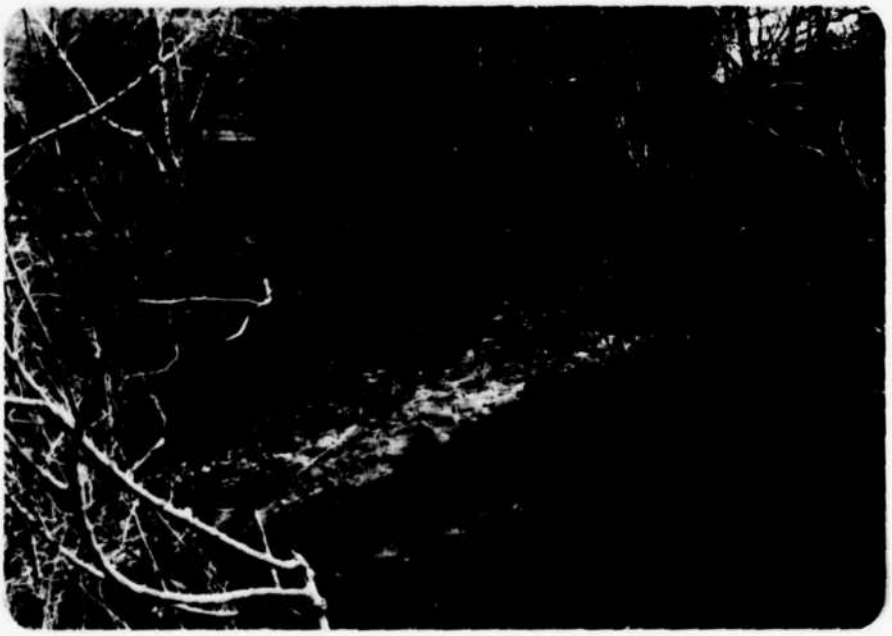
APPENDIX B

2. VIEW OF CREST TOWARDS LEFT ABUTMENT FROM GATEHOUSE



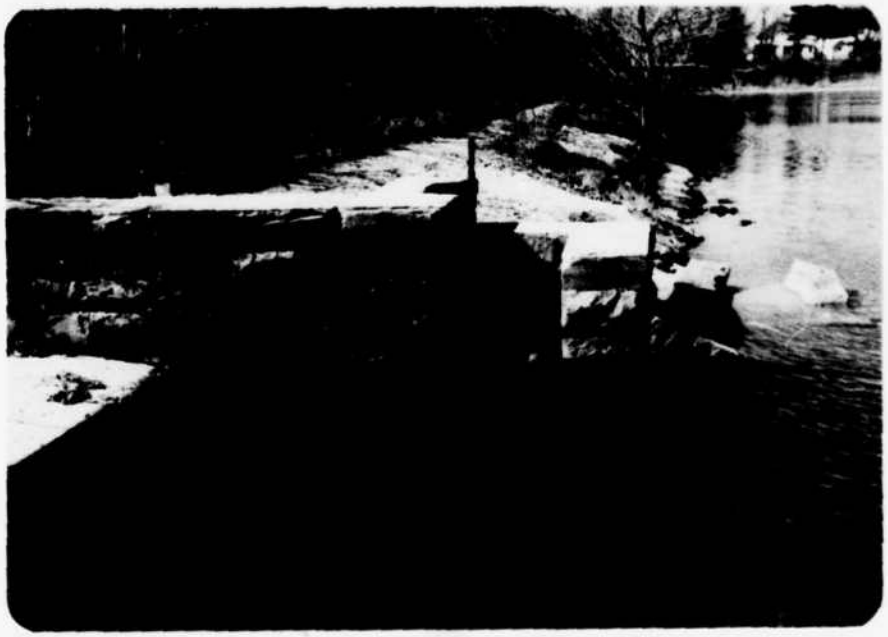
3. VIEW OF CREST TOWARDS SPILLWAY FROM LEFT ABUTMENT (NOTE: EROSION AND CONDITION OF TRAINING WALL)

4. VIEW OF UPSTREAM FACE NEAR RIGHT ABUTMENT
(NOTE: EROSION OF FACE AND CREST)



5. VIEW OF UPSTREAM FACE NEAR SPILLWAY
(NOTE: STONE PAVING)

6. VIEW OF SPILLWAY FROM DOWNSTREAM SIDE



7. VIEW OF APPROACH CHANNEL AND SPILLWAY TRAINING WALL

8. VIEW OF AUXILIARY SPILLWAY STRUCTURE

9. SEEPAGE PONDING NEAR TOE OF DAM LEFT OF SPILLWAY

VISUAL INSPECTION CHECKLIST

APPENDIX C

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam South Pond Dam

Fed. I.D. # NY 109 DEC Dam No. 234-192

River Basin Long Island

Location: Town Rockville Centre County Nassau

Stream Name Mill River

Tributary of ———

Latitude (N) 40-40.1 Longitude (W) 73-39.2

Type of Dam Earth with Rockfill

Hazard Category 1

Date(s) of Inspection March 13, 1981

Weather Conditions ———

Reservoir Level at Time of Inspection ———

b. Inspection Personnel Harvey Feldman, Joe Fiten Jr.

c. Persons Contacted (Including Address & Phone No.) Art Larson, NYC Bureau of Water Supply, 119-45 Union Tpk, Forest Hills, N.Y. 11375 (212) 520-3467. Also Mr Edward Conway at same address.

d. History:

Date Constructed 1901 Date(s) Reconstructed ———

Designer Not Known

Constructed By Not Known

Owner New York City Water Supply

2) Embankment

a. Characteristics

(1) Embankment Material Sand

(2) Cutoff Type Not known

(3) Impervious Core Sandy CLAY

(4) Internal Drainage System Not Known

(5) Miscellaneous Upstream Face was originally stone paved Some areas of paving remain

b. Crest

(1) Vertical Alignment IRRegular - Erosion by surface runoff and Footpaths

(2) Horizontal Alignment OK where visible, but also somewhat irregular due to erosion

(3) Surface Cracks None visible.

(4) Miscellaneous Local sloughing of up and downstream faces results in irregularities to crest

c. Upstream Slope

(1) Slope (Estimate) (V:H) Upper 1V:3H, lower 1V:4H

(2) Undesirable Growth or Debris, Animal Burrows Upstream slope has line of trees just below crest, also shrub growth.

(3) Sloughing, Subsidence or Depressions Where surface paving has broken away, large amount of local sloughing and erosion of the sandy embankment material

(4) Slope Protection For the most broken away above and just below the waterline resulting erosion of underlying granular materials

(5) Surface Cracks or Movement at Toe local sloughing at waterline, Toe not visible

d. Downstream Slope

(1) Slope (Estimate - V:H) Upper 1V:3H, lower 1V:2H

(2) Undesirable Growth or Debris, Animal Burrows Entire lower slope covered by trees - (8" mardiam.) and brush growth

(3) Sloughing, Subsidence or Depressions No Subsidence. Depressions and local Sloughing however exist due to footpaths and surface drainage

(4) Surface Cracks or Movement at Toe None Visible

(5) Seepage Possible seepage just left of spillway near toe of dam. Not clear if seepage or surface runoff, but flow quantity (5 gpm) and clarity indicate Seepage

(6) External Drainage System (Ditches, Trenches; Blanket) None

(7) Condition Around Outlet Structure OK

(8) Seepage Beyond Toe None observed except as above.

e. Abutments - Embankment Contact

OK where visible

(1) Erosion at Contact None evident

(2) Seepage Along Contact None evident.

3) Drainage System

a. Description of System Horsloe Shaped Brick Aqueduct, to NYC water supply.

b. Condition of System Inoperable

c. Discharge from Drainage System None possible

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.) None present

5) Reservoir

a. Slopes Very minor relief in reservoir area
No large slopes present, no problems on small slopes

b. Sedimentation Some fine sandy sedimentation in upstream area of dam

c. Unusual Conditions Which Affect Dam Reservoir is directly downstream about ¼ mile) from much larger reservoir which if breeched or emptied would discharge totally or partially into South Pond.

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) Very High Hazard. Dam Located in middle of Suburban Area. Two Highways & Railroad directly downstream

b. Seepage, Unusual Growth Area directly downstream very overgrown

c. Evidence of Movement Beyond Toe of Dam None

d. Condition of Downstream Channel overgrown and full of debris

7) Spillway(s) (Including Discharge Conveyance Channel)

Two - Auxiliary as part of discharge System - Service-Uncontrolled overflow weir section (masonry)

a. General Whether the Service or Auxiliary Spillways have been maintained resulting in conditions of disrepair

b. Condition of Service Spillway Spillway in generally poor condition, upstream & downstream channels clogged by debris. Seepage through downstream face near coprork of weir and various places in face. Seepage also near toe of downstream right training wall. Two Small gates that would allow water to pass around the lower ends of the spillway are inoperable

c. Condition of Auxiliary Spillway Spillway itself is okay accept for some undermining at end of step structure. Unable to ascertain intake structure condition and conduit under road, as they are part of Aqueduct system.

d. Condition of Discharge Conveyance Channel Full of debris, natural and otherwise.

b) Reservoir Drain/Outlet

Type: Pipe _____ Conduit _____ Other Horseshoe Aqueduct

Material: Concrete _____ Metal _____ Other Brick

Size: base 6', height (MAX) 4½' Length: Not known

Invert Elevations: Entrance N/A Exit NA

Physical Condition (Describe): Unobservable ✓

Material: _____

Joints: _____ Alignment _____

Structural Integrity: _____

_____

Hydraulic Capability: _____

_____

Means of Control: Gate ✓ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable ✓ Other _____

Present Condition (Describe): Poor.

_____

c) Structural

a. Concrete Surfaces See Item #7

b. Structural Cracking See Item #7

c. Movement - Horizontal & Vertical Alignment (Settlement) See Item #7

d. Junctions with Abutments or Embankments See Item #7

e. Drains - Foundation, Joint, Face None observed

f. Water Passages, Conduits, Sluices See Items 7 & 8

g. Seepage or Leakage See Items 7 and 8

h. Joints - Construction, etc. See item 7 and 8

i. Foundation of Dam and Spillway is glacial till.

j. Abutments N/A

k. Control Gates See item #8

l. Approach & Outlet Channels See items 7 and 8

m. Energy Dissipators (Plunge Pool, etc.) N/A

n. Intake Structures See item 8

o. Stability See items 7 and 8

p. Miscellaneous +

10) Appurtenant Structures (Powerhouse, Lock, Gatehouse, Other)

a. Description and Condition No Appurtenant Structures present

South Pond

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX D

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	15.75	23.5	187
2) Design High Water (Max. Design Pool)	Not known		
3) Auxiliary Spillway Crest	Not known		
4) Pool Level with Flashboards	N/A		
5) Service Spillway Crest	12	21	83

DISCHARGES

	Volume (cfs)
1) Average Daily	unknown
2) Spillway @ Maximum High Water	600 cfs
3) Spillway @ Design High Water	unknown
4) Spillway @ Auxiliary Spillway Crest Elevation	———
5) Low Level Outlet	unknown
6) Total (of all facilities) @ Maximum High Water	600cfs
7) Maximum Known Flood	———
8) At Time of Inspection	None

CREST: DAM ELEVATION: 15.75

Type: EARTH

Width: 10 ft Length: 800 feet

Spillover Broad Crested uncontrolled masonry Struc.

Location ≈160' from left abutment

SPILLWAY:

SERVICE		AUXILIARY
12	Elevation	Not Known
Broad Crested Weir	Type	overflow of outlet works
	Width	6' x 2½' rectangle
	Type of Control	Not known
✓	Uncontrolled	
	Controlled:	
	Type (Flashboards; gate)	
	Number	
	Size/Length	
	Invert Material	
	Anticipated Length of operating service	
10ft sloped trainingwall	Chute Length	44 feet
2ft.	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	Not known

HYDROMETEROLOGICAL GAGES:

Type : None Used in analysis

Location: _____

Records: None Available

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM: None

Warning System: _____

_____

Method of Contrciled Releases (mechanisms):

UNKNOWN

_____

DRAINAGE AREA: 16.0 Sq Miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: URBAN

Terrain - Relief: Flat

Surface - Soil: Sandy - Highly Permeable

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

Urban development is estimated to cover 32% of basin (roads, parking lots, etc). Natural runoff effected by Storm Sewers and detention basins

Potential Sedimentation problem areas (natural or man-made; present or future)

Unknown

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

With large discharges, Backwater will probably occur due to Flow over Lakeview Ave

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter: None Observed

Location: _____

Elevation: _____

Reservoir:

Length @ Maximum Pool 0.29 (Miles)

Length of Shoreline (@ Spillway Crest) 0.76 (Miles)

TAMS

Job No. _____ Sheet 1 of 23

Project SOUTH POND DAM INSPECTION. Date APRIL 1, 81

Subject HYDROLOGIC / HYDRAULIC COMPUTATIONS By D.L.C.

Ch'k. by _____

DRAINAGE AREA

7.46 in² ~ 1.06 sq miles

LAKE AREA

0.23 in² ~ 21 acres

LAKE PERIMETER

2" = 4000' = 0.76 m.

20' CONTOUR

0.375 in² ~ 34.4 acres

25' Contour

0.735 in² ~ 67.5 acres

SNYDER Coef.'s adapted from ajacent basin.

$C_t = 2.05$ $C_p = 0.7$

$t_p = 2.9$ hrs

$q_p = 164.5$ cfs.

$L = 2.84$ miles

$L_{CA} = 1.1$ mile

TAMS

Job No. _____ Sheet 2 of 23

Project South Pond Dam Investigation Date Apr 1. 81

Subject Hydrologic/Hydraulic Computations By D.LC

Ch'k. by _____

El	ΔH	Area	Mean Area	Δ Vol.	Surcharge
12		21			0
	8		27.7	222	
20		34.4			222
	5		50.95	255.	
25		67.5			447

Normal Storage Listed as 26.9 million gals. (1 ac-ft = 3.258 × 10⁵ gal)

ie 82.6 acre feet

El	Capacity
12	82.6
20	305
25	530

Spillway Rating

Crest El 12.0 Length 24.75 Top of Dam El 15.75

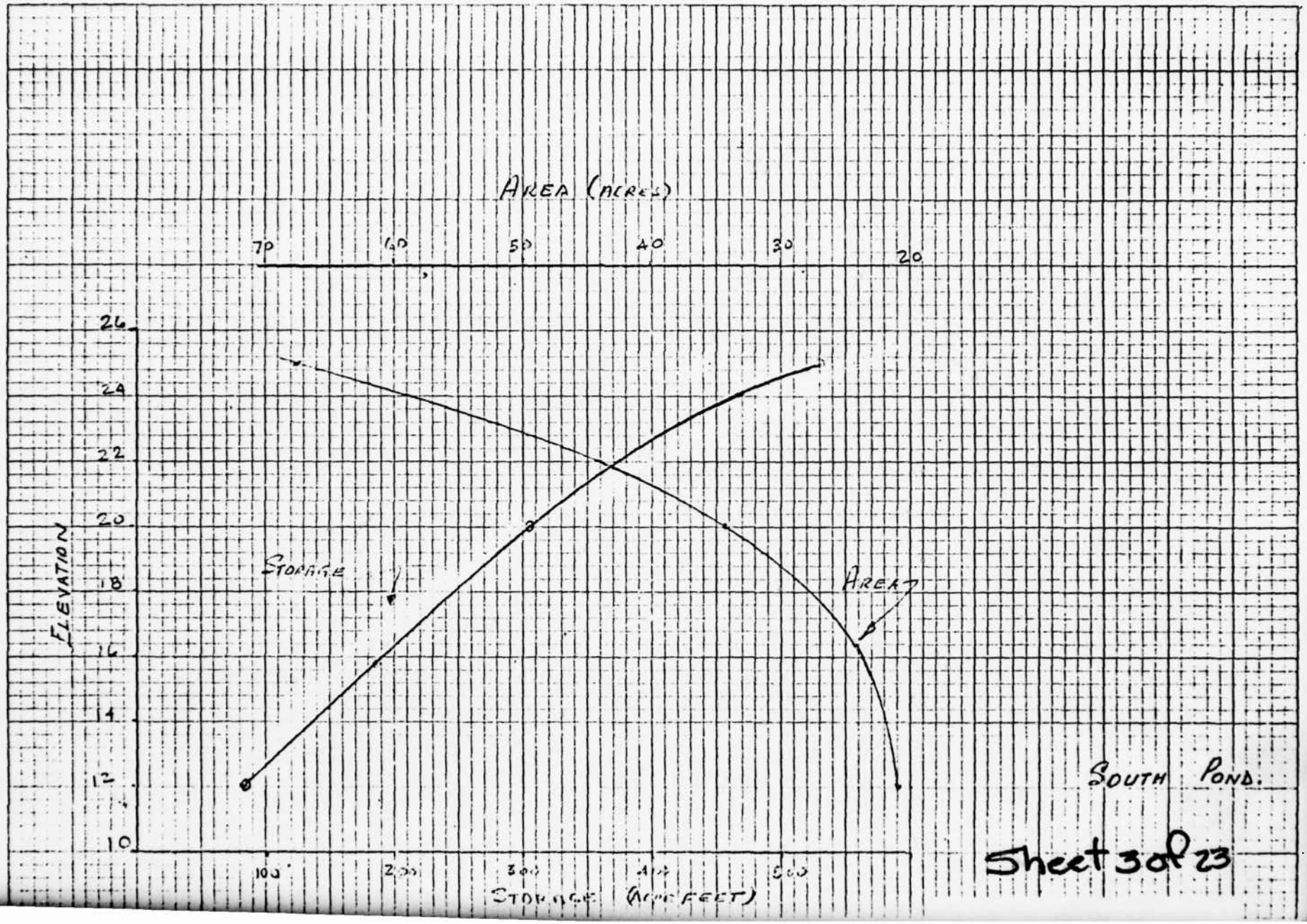
El	h	C	Q
12	0		
13	1	2.98	74
14	2	3.30	230
15.75	3.75	3.32	680
20	8	3.32	1860
25	13	3.32	3850

Dam dimensions

L = 800'

Q at El 20 ~ 2172 cfs

(Crest El taken from drawing.)



SOUTH POND.

TAMS

Job No. _____ Sheet 4 of 23

Project SOUTH POND DAM Date APRIL 10, 91

Subject HYDROLOGIC/HYDRAULIC COMPUTATION By DLC

Ch'k. by _____

Down stream Water surface ELEVATION

Assume average elevation of PENINSULA BLVD = 15.0' MSL

Also Assume Effective length of Road overtopped = 1500'

Flow through 4'x11.25' culvert will not exceed 500 cfs

PMF ~ 16840+ - depth over road ~ 3.4'

½ PMF 8580 cfs ± " " ~ 2.1'

RESULTING D/S ELEVATIONS

PMF – 17.3'

½ PMF – 16.5'

ELEVATION of DAM 15.75'

```
************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
LAST MODIFICATION  01 APR 81
************************************
            A1
                                     SOUTH POND DAM INSPECTION
            A2                       HEC-1DB PMF ANALYSIS
            B    61      1      0      0      0      0      0      0      0      0
            B1    5
            J     1      4      1
            J1    1    .75     .5    .25
            K     0      1                                 1
            K1       1 HEMPSTEAD LAKE INFLOW
            M     1     -1    9.8           14.9                               1
            P           22    110    120     128    140
            T                                                2.2   0.24           .32
            U    30
            U1   [illegible]   56    220    260    640    920    780    600    430    340
            U1   270    200    170    130    120    100     95     75     65     58
            U1    50     42     32     20     15     10      3
            X    -1   -.05    1.5
            K     1      2                                 1
            K1       3 RESERVOIR ROUTING HEMPSTEAD LAKE
            Y                          1      1
            Y1    1                                       1400     -1
            Y4   [illegible]   30     31     32     34     36     38
            Y5    0     76    250    250    323    337    350
            $S   520    650   1400   2500   3450
            $E    22     25     29     34     40
            $$   [illegible]
            $D   [illegible]   [illegible]    1.5   1000
            K     1      2                                 1
            K1       4 SUB-BASIN RUNOFF TO SOUTH POND
            M     1      1    1.1           14.9                               1
            P           22    110    120     128    140
            T                                                2.2   0.24           .32
            W    2.9     .7
            X    -1   -.05    1.5
            K     2      2                                 1
            K1       5 COMBINE 2 HYDROGRAPHS
            P     1      2                                 1
            K1       6 SOUTH POND ROUTING
            Y                          1      1
            Y1    1                                       82.6     -1
            Y4   12     13     14  15.75     20     25
            Y5    0     74    230    600   1660   3850
            $S  22.6    205    560.
            $E   12     20     25
            $$   12
            $D 15.75  [illegible]    1.5    900
            K    99
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

Sheet 5 of 23

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  6.1 APR 80
**********

RUN  DATE= 81/08/07.
     TIME= 12.25.43.
```

HEMPSTEAD LAKE DAM INSPECTION
SOUTH POND DAM INSPECTION
HEC-1DB PMF ANALYSIS

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
60	1	0	0	0	0	0	0	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1

RTIOS= 1.00 .75 .50 .25

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

1 HEMPSTEAD LAKE INFLOW

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INFLG	IUHG	TAREA	SNAP	IRSDA	IRSPC	RATIO	ISNOW	ISAME	LOCAL
1	-1	9.80	0.00	14.90	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PPS	R6	R12	R24	R48	R72	R96
0.00	23.00	110.00	120.00	128.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .914

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	PTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	2.20	.24	0.00	.32

GIVEN UNIT GRAPH, NUHGO= 30

20.	50.	220.	660.	860.	920.	780.	600.	430.	340.
260.	200.	170.	130.	120.	100.	85.	75.	65.	58.
50.	42.	32.	20.	15.	10.	3.	0.	0.	0.

UNIT GRAPH TOTALS 6315. CFS OR 1.00 INCHES OVER THE AREA

RECESSION DATA

STRTQ= -1.00 QRCSN= -.05 RTIOR= 1.50

0 END-OF-PERIOD FLOW

Sheet 7 of 23

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	.00	.01	9.	1.02	7.00	31	.31	.15	.16	188.
1.01	2.00	2	.01	.00	.01	9.	1.02	8.00	32	.31	.15	.16	203.
1.01	3.00	3	.01	.00	.01	10.	1.02	9.00	33	.31	.15	.16	233.
1.01	4.00	4	.01	.00	.01	11.	1.02	10.00	34	.31	.15	.16	314.
1.01	5.00	5	.01	.00	.01	13.	1.02	11.00	35	.31	.15	.16	416.
1.01	6.00	6	.01	.00	.01	16.	1.02	12.00	36	.31	.15	.16	524.
1.01	7.00	7	.01	.01	.02	19.	1.02	13.00	37	2.06	1.90	.16	649.
											2.21	.16	814.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	.00	.01	9.	1.02	7.00	31	.31	.15	.16	188.
1.01	2.00	2	.01	.00	.01	9.	1.02	8.00	32	.31	.15	.16	203.
1.01	3.00	3	.01	.00	.01	10.	1.02	9.00	33	.31	.15	.16	233.
1.01	4.00	4	.01	.00	.01	11.	1.02	10.00	34	.31	.15	.16	314.
1.01	5.00	5	.01	.00	.01	13.	1.02	11.00	35	.31	.15	.16	416.
1.01	6.00	6	.01	.00	.01	16.	1.02	12.00	36	.31	.15	.16	524.
1.01	7.00	7	.03	.01	.02	19.	1.02	13.00	37	2.06	1.90	.16	649.
1.01	8.00	8	.03	.01	.02	20.	1.02	14.00	38	2.47	2.31	.16	813.
1.01	9.00	9	.03	.01	.02	22.	1.02	15.00	39	3.09	2.92	.16	1278.
1.01	10.00	10	.03	.01	.02	27.	1.02	16.00	40	7.82	7.66	.16	2686.
1.01	11.00	11	.03	.01	.02	33.	1.02	17.00	41	2.88	2.72	.16	4763.
1.01	12.00	12	.03	.01	.02	39.	1.02	18.00	42	2.26	2.10	.16	7936.
1.01	13.00	13	.19	.06	.13	46.	1.02	19.00	43	.15	.05	.10	12194.
1.01	14.00	14	.23	.07	.16	53.	1.02	20.00	44	.15	.05	.10	14720.
1.01	15.00	15	.29	.09	.20	68.	1.02	21.00	45	.15	.05	.10	15462.
1.01	16.00	16	.73	.23	.50	111.	1.02	22.00	46	.15	.05	.10	13978.
1.01	17.00	17	.27	.09	.18	174.	1.02	23.00	47	.15	.05	.10	11402.
1.01	18.00	18	.21	.07	.14	270.	1.03	0.00	48	.15	.05	.10	8778.
1.01	19.00	19	.01	.00	.01	398.	1.03	1.00	49	0.00	0.00	0.00	6839.
1.01	20.00	20	.01	.00	.01	474.	1.03	2.00	50	0.00	0.00	0.00	5318.
1.01	21.00	21	.01	.00	.01	497.	1.03	3.00	51	0.00	0.00	0.00	4251.
1.01	22.00	22	.01	.00	.01	448.	1.03	4.00	52	0.00	0.00	0.00	3486.
1.01	23.00	23	.01	.00	.01	372.	1.03	5.00	53	0.00	0.00	0.00	2831.
1.02	0.00	24	.01	.00	.01	292.	1.03	6.00	54	0.00	0.00	0.00	2427.
1.02	1.00	25	.10	.03	.07	233.	1.03	7.00	55	0.00	0.00	0.00	2040.
1.02	2.00	26	.10	.03	.07	188.	1.03	8.00	56	0.00	0.00	0.00	1754.
1.02	3.00	27	.10	.03	.07	161.	1.03	9.00	57	0.00	0.00	0.00	1512.
1.02	4.00	28	.10	.03	.07	157.	1.03	10.00	58	0.00	0.00	0.00	1305.
1.02	5.00	29	.10	.03	.07	162.	1.03	11.00	59	0.00	0.00	0.00	1129.
1.02	6.00	30	.10	.03	.07	176.	1.03	12.00	60	0.00	0.00	0.00	949.
									SUM	26.20	21.69	4.50	134785.
										(665.)	(551.)	(114.)	(3816.69)

		PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
	CFS	15462.	12669.	5341.	2239.	134304.
	CMS	438.	359.	151.	63.	3803.
	INCHES		12.03	20.28	21.25	21.25
	MM		305.45	515.09	539.68	539.68
	AC-FT		6282.	10594.	11100.	11100.
	THOUS CU M		7749.	13067.	13691.	13691.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

9.	9.	10.	11.	13.	16.	18.	20.	22.	27.
33.	39.	46.	53.	68.	111.	174.	270.	398.	474.
497.	448.	372.	292.	233.	188.	161.	157.	162.	176.
188.	203.	233.	314.	416.	524.	649.	813.	1278.	2686.
4763.	7936.	12194.	14720.	15462.	13978.	11402.	8778.	6839.	5318.
4251.	3486.	2831.	2427.	2040.	1754.	1512.	1305.	1129.	949.

		PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
	CFS	15462.	12669.	5341.	2239.	134304.
	CMS	438.	359.	151.	63.	3803.
	INCHES		12.03	20.28	21.25	21.25
	MM		305.45	515.09	539.68	539.68
	AC-FT		6282.	10594.	11100.	11100.
	THOUS CU M		7749.	13067.	13691.	13691.

Sheet 8 of 13

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

7.	7.	7.	8.	10.	12.	14.	15.	17.	20.
25.	30.	34.	39.	51.	82.	131.	203.	299.	356.

	AC-FT		6282.	10594.	11100.		11100.			
	THOUS CU M		7749.	13067.	13691.		13691.			

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

7.	7.	7.	8.	10.	12.	14.	15.	17.	20.
25.	30.	34.	39.	51.	83.	131.	203.	299.	356.
372.	334.	279.	219.	175.	141.	121.	118.	121.	132.
141.	152.	175.	235.	312.	393.	487.	610.	959.	2014.
3572.	5952.	9146.	11040.	11597.	10409.	8551.	6584.	5129.	3988.
3188.	2615.	2123.	1820.	1530.	1315.	1134.	978.	847.	712.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	11597.	9502.	4006.	1679.	100728.
CMS	328.	269.	113.	48.	2852.
INCHES		9.02	15.71	15.94	15.94
MM		229.09	398.32	404.76	404.76
AC-FT		4712.	7945.	8325.	8325.
THOUS CU M		5812.	9800.	10268.	10268.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

5.	5.	5.	6.	7.	8.	9.	10.	11.	14.
17.	20.	23.	26.	34.	56.	87.	135.	199.	237.
248.	224.	186.	146.	117.	94.	81.	78.	81.	88.
94.	101.	117.	157.	208.	262.	325.	406.	639.	1343.
2381.	3968.	6097.	7360.	7731.	6939.	5701.	4389.	3419.	2659.
2125.	1743.	1415.	1214.	1020.	877.	756.	652.	564.	475.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7731.	6334.	2671.	1119.	67152.
CMS	219.	179.	76.	32.	1902.
INCHES		6.01	10.14	10.62	10.62
MM		152.72	257.55	269.84	269.84
AC-FT		3141.	5297.	5550.	5550.
THOUS CU M		3874.	6534.	6846.	6846.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 4

2.	2.	2.	3.	3.	4.	5.	5.	6.	7.
8.	10.	11.	13.	17.	28.	44.	68.	100.	119.
124.	112.	93.	73.	58.	47.	40.	39.	40.	44.
47.	51.	58.	78.	104.	131.	162.	203.	320.	671.
1191.	1984.	3049.	3680.	3866.	3470.	2850.	2195.	1710.	1329.
1063.	872.	708.	607.	510.	438.	378.	326.	282.	237.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3866.	3167.	1335.	560.	33576.
CMS	109.	90.	38.	16.	951.
INCHES		3.01	5.07	5.31	5.31
MM		76.36	128.77	134.92	134.92
AC-FT		1571.	2648.	2775.	2775.
THOUS CU M		1937.	3267.	3423.	3423.

Sheet 9 of 23

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HYDROGRAPH ROUTING

3 RESERVOIR ROUTING HEMPSTEAD LAKE

ITAN	ICOMP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

3 RESERVOIR ROUTING HEMPSTEAD LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IFMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	1400.	-1

STAGE	29.00	30.00	31.00	32.00	34.00	36.00	38.00
FLOW	0.00	74.00	200.00	280.00	323.00	337.00	350.00
CAPACITY=	520.	650.	1400.	2500.	3450.		
ELEVATION=	22.	25.	29.	34.	40.		

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
34.0	3.1	1.5	1200.

STATION 3, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	1.	1.	1.	2.	2.	3.	3.	4.	4.
5.	6.	7.	9.	11.	13.	18.	24.	35.	48.
65.	78.	97.	110.	119.	124.	127.	128.	130.	132.
135.	139.	143.	150.	162.	180.	202.	221.	250.	289.
323.	6094.	10924.	14169.	15374.	14453.	12113.	9568.	7424.	5840.
4640.	3793.	3119.	2615.	2235.	1908.	1651.	1431.	1243.	1071.

STORAGE

1401.	1402.	1402.	1403.	1404.	1405.	1406.	1407.	1409.	1411.
1413.	1415.	1418.	1422.	1426.	1432.	1443.	1459.	1485.	1517.
1553.	1586.	1613.	1631.	1644.	1651.	1655.	1658.	1660.	1663.
1667.	1672.	1679.	1689.	1706.	1731.	1764.	1807.	1874.	2015.
2296.	2557.	2686.	2761.	2787.	2767.	2714.	2652.	2595.	2550.
2518.	2493.	2459.	2439.	2423.	2409.	2396.	2386.	2376.	2366.

STAGE

29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.3	29.5	29.7
29.8	30.0	30.2	30.3	30.4	30.4	30.4	30.4	30.4	30.5
30.5	30.5	30.5	30.6	30.7	30.8	31.0	31.3	31.6	32.4
34.0	35.3	36.0	36.4	36.5	36.4	36.2	35.8	35.5	35.3
35.1	35.0	34.8	34.7	34.6	34.6	34.5	34.4	34.4	34.3

PEAK OUTFLOW IS 15374. AT TIME 45.00 HOURS

Sheet 10 of 23

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	15374.	12477.	5021.	2044.	122627.
CMS	435.	353.	142.	58.	3472.
INCHES		11.84	19.06	19.40	19.40
MM		300.83	484.22	492.76	492.76

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	15374.	12477.	5021.	2044.	122627.
CMS	435.	353.	142.	58.	3472.
INCHES		11.84	19.06	19.40	19.40
MM		300.83	484.22	492.76	492.76
AC-FT		6187.	9959.	10134.	10134.
THOUS CU M		7632.	12284.	12501.	12501.

STATION 3, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	1.	1.	1.	2.	2.	2.	3.	3.
4.	5.	6.	7.	8.	10.	13.	18.	26.	36.
47.	57.	66.	72.	77.	82.	85.	87.	89.	91.
93.	96.	100.	106.	115.	129.	146.	169.	202.	248.
276.	1584.	6146.	10548.	11520.	10866.	9140.	7234.	5620.	4421.
3515.	2872.	2364.	1982.	1693.	1447.	1252.	1086.	945.	816.

STORAGE

1401.	1401.	1402.	1402.	1403.	1404.	1405.	1406.	1407.	1408.
1410.	1411.	1414.	1416.	1419.	1424.	1432.	1445.	1465.	1498.
1515.	1539.	1560.	1575.	1585.	1591.	1595.	1598.	1601.	1604.
1607.	1612.	1617.	1626.	1639.	1658.	1683.	1715.	1765.	1869.
2077.	2393.	2615.	2677.	2700.	2684.	2641.	2590.	2543.	2505.
2473.	2449.	2429.	2412.	2399.	2386.	2376.	2367.	2358.	2350.

STAGE

29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.4	29.5
29.6	29.8	29.9	30.0	30.0	30.1	30.1	30.1	30.1	30.1
30.2	30.2	30.2	30.3	30.3	30.4	30.6	30.8	31.0	31.6
32.8	34.5	35.6	36.0	36.1	36.0	35.8	35.5	35.3	35.1
34.9	34.8	34.7	34.6	34.5	34.5	34.4	34.3	34.3	34.3

PEAK OUTFLOW IS 11520. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	11520.	9365.	3657.	1487.	89241.
CMS	326.	265.	104.	42.	2527.
INCHES		8.89	13.89	14.12	14.12
MM		225.79	352.68	358.60	358.60
AC-FT		4644.	7254.	7375.	7375.
THOUS CU M		5728.	8947.	9097.	9097.

STATION 3, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	1.	1.	1.	1.	2.	2.	2.
3.	3.	4.	4.	5.	7.	9.	12.	17.	24.
31.	38.	44.	48.	51.	52.	54.	54.	55.	56.
57.	59.	60.	63.	67.	73.	84.	100.	124.	172.
743.	2977.	2662.	7197.	7614.	7280.	6148.	4885.	3803.	2994.
2363.	1946.	1603.	1344.	1149.	983.	852.	741.	646.	561.

Sheet 11 of 23

STORAGE

1400.	1401.	1401.	1401.	1402.	1402.	1403.	1404.	1404.	1405.
[illegible]	[illegible]	1409.	1411.	1413.	1416.	1422.	1430.	1442.	1459.

57.	59.	60.	65.	67.	73.	84.	100.	124.	172.
243.	299.	2082.	7197.	7614.	7280.	6148.	4885.	3803.	2994.
2383.	1960.	1603.	1344.	1149.	997.	852.	741.	646.	561.

STORAGE

1400.	1401.	1401.	1401.	1402.	1402.	1403.	1404.	1404.	1405.
1406.	1408.	1409.	1411.	1413.	1416.	1421.	1430.	1442.	1459.
1476.	1495.	1507.	1514.	1523.	1529.	1530.	1533.	1535.	1537.
1540.	1543.	1547.	1553.	1563.	1577.	1594.	1617.	1651.	1721.
1857.	2097.	2416.	2583.	2601.	2591.	2559.	2520.	2483.	2454.
2429.	2410.	2394.	2381.	2370.	2361.	2352.	2345.	2338.	2331.

STAGE

29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.3
29.4	29.5	29.6	29.6	29.7	29.7	29.7	29.7	29.7	29.8
29.8	29.8	29.8	29.9	29.9	30.0	30.1	30.2	30.4	30.8
31.5	32.9	34.6	35.5	35.6	35.5	35.3	35.1	35.0	34.8
34.7	34.6	34.5	34.4	34.4	34.3	34.3	34.2	34.2	34.2

PEAK OUTFLOW IS 7614. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7614.	6009.	2290.	932.	55893.
CMS	216.	170.	65.	26.	1583.
INCHES		5.70	8.70	8.84	8.84
MM		144.89	220.88	224.60	224.60
AC-FT		2980.	4543.	4619.	4619.
THOUS CU M		3676.	5603.	5698.	5698.

STATION 3, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	2.	2.	2.	3.	3.	4.	6.	9.	12.
16.	19.	22.	24.	25.	24.	27.	27.	28.	28.
29.	29.	30.	32.	34.	36.	40.	45.	52.	67.
111.	194.	290.	310.	1959.	3704.	3127.	2508.	1963.	1550.
1237.	1011.	836.	703.	602.	519.	453.	398.	356.	326.

STORAGE

1400.	1400.	1401.	1401.	1401.	1401.	1402.	1402.	1402.	1403.
1403.	1404.	1405.	1405.	1406.	1408.	1411.	1415.	1421.	1429.
1439.	1446.	1453.	1459.	1462.	1464.	1465.	1466.	1467.	1469.
1470.	1472.	1474.	1477.	1482.	1488.	1497.	1509.	1527.	1563.
1632.	1751.	1939.	2193.	2411.	2480.	2459.	2435.	2411.	2392.
2375.	2362.	2351.	2342.	2334.	2327.	2320.	2314.	2308.	2302.

STAGE

29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.2
29.2	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4
29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.6	29.7	29.9
30.3	30.9	32.0	33.4	34.6	34.9	34.8	34.7	34.6	34.5
34.4	34.3	34.3	34.2	34.2	34.1	34.1	34.1	34.0	34.0

Sheet 12 of 23

PEAK OUTFLOW IS 3704. AT TIME 46.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3704.	2408.	925.	378.	22669.
CMS	105.	68.	26.	11.	642.
INCHES		[illegible]	[illegible]	[illegible]	[illegible]

34.4 34.3 34.3 34.2 34.2 34.1 34.1 34.1 34.0 34.0

PEAK OUTFLOW IS 3704. AT TIME 46.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3704.	2408.	925.	378.	22669.
CMS	105.	68.	26.	11.	642.
INCHES		2.29	3.51	3.59	3.59
MM		58.06	89.23	91.09	91.09
AC-FT		1194.	1835.	1874.	1874.
THOUS CU M		1473.	2264.	2311.	2311.

****

SUB-AREA RUNOFF COMPUTATION

4 SUB-BASIN RUNOFF TO SOUTH POND

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.10	0.00	14.90	0.00	0.000	0	1	0

PRICIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.00	110.00	120.00	129.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .814

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	FRAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	2.20	.24	0.00	.32

UNIT HYDROGRAPH DATA

TP= 2.90 CP= .70 NTA= 0

RECESSION DATA

STRTQ= -1.00 QRCSN= -.05 RTIOR= 1.50

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.79 AND R= 1.71 INTERVALS

UNIT HYDROGRAPH 12 END-OF-PERIOD ORDINATES, LAG= 2.85 HOURS, CP= .69 VOL= 1.00

31. 103. 165. 164. 111. 61. 34. 18. 10. 6.
3. 2.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	1.00	1	.01	.00	.01	1.	1.02	7.00	31	.31	.15	.16	25.
1.01	2.00	2	.01	.00	.01	1.	1.02	8.00	32	.31	.15	.16	38.
1.01	3.00	3	.01	.00	.01	2.	1.02	9.00	33	.31	.15	.16	57.
1.01	4.00	4	.01	.00	.01	2.	1.02	10.00	34	.31	.15	.16	77.
1.01	5.00	5	.01	.00	.01	3.	1.02	11.00	35	.31	.15	.16	90.
1.01	6.00	6	.01	.00	.01	3.	1.02	12.00	36	.31	.15	.16	97.
1.01	7.00	7	.03	.01	.02	3.	1.02	13.00	37	2.06	1.90	.16	155.
1.01	8.00	8	.03	.01	.02	4.	1.02	14.00	38	2.47	2.31	.16	350.
1.01	9.00	9	.03	.01	.02	5.	1.02	15.00	39	3.09	2.92	.16	700.
1.01	10.00	10	.04	.01	.02	6.	1.02	16.00	40	7.82	7.66	.16	1264.
1.01	11.00	11	.03	.01	.02	6.	1.02	17.00	41	2.88	2.72	.16	1966.
1.01	12.00	12	.03	.01	.02	7.	1.02	18.00	42	2.26	2.10	.16	2470.
1.01	13.00	13	.19	.04	.15	9.	1.02	19.00	43	.15	.05	.10	2458.
1.01	14.00	14	.17	.07	.14	12.	1.02	20.00	44	.15	.05	.10	1946.
1.01	15.00	15	.17	.06	.11	14.	1.02	21.00	45	.15	.05	.10	1491.

Sheet 13 of 23

1.01	9.00	9	.03	.01	.02	5.	1.02	15.00	39	3.09	2.92	.16	700.
1.01	10.00	10	.03	.01	.02	6.	1.02	16.00	40	7.82	7.66	.16	1264.
1.01	11.00	11	.03	.01	.02	6.	1.02	17.00	41	2.88	2.72	.16	1966.
1.01	12.00	12	.07	.01	.02	7.	1.02	18.00	42	2.26	2.10	.16	2470.
1.01	13.00	13	.19	.06	.13	9.	1.02	19.00	43	.15	.05	.10	2458.
1.01	14.00	14	.23	.07	.16	15.	1.02	20.00	44	.15	.05	.10	1946.
1.01	15.00	15	.29	.09	.20	25.	1.02	21.00	45	.15	.05	.10	1291.
1.01	16.00	16	.73	.23	.50	42.	1.02	22.00	46	.15	.05	.10	768.
1.01	17.00	17	.27	.09	.18	63.	1.02	23.00	47	.15	.05	.10	436.
1.01	18.00	18	.21	.07	.14	78.	1.03	0.00	48	.15	.05	.10	255.
1.01	19.00	19	.01	.00	.01	78.	1.03	1.00	49	0.00	0.00	0.00	152.
1.01	20.00	20	.01	.00	.01	62.	1.03	2.00	50	0.00	0.00	0.00	121.
1.01	21.00	21	.01	.00	.01	42.	1.03	3.00	51	0.00	0.00	0.00	116.
1.01	22.00	22	.01	.00	.01	26.	1.03	4.00	52	0.00	0.00	0.00	111.
1.01	23.00	23	.01	.00	.01	16.	1.03	5.00	53	0.00	0.00	0.00	107.
1.02	0.00	24	.01	.00	.01	10.	1.03	6.00	54	0.00	0.00	0.00	103.
1.02	1.00	25	.10	.03	.07	8.	1.03	7.00	55	0.00	0.00	0.00	99.
1.02	2.00	26	.10	.03	.07	9.	1.03	8.00	56	0.00	0.00	0.00	95.
1.02	3.00	27	.10	.03	.07	13.	1.03	9.00	57	0.00	0.00	0.00	91.
1.02	4.00	28	.10	.03	.07	17.	1.03	10.00	58	0.00	0.00	0.00	87.
1.02	5.00	29	.10	.03	.07	19.	1.03	11.00	59	0.00	0.00	0.00	84.
1.02	6.00	30	.10	.03	.07	21.	1.03	12.00	60	0.00	0.00	0.00	81.
									SUM	26.20	21.69	4.50	16286.
										(665.)	(551.)	(114.)	(461.17)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2470.	1858.	639.	271.	16243.
CMS	70.	53.	18.	8.	460.
INCHES		15.71	21.60	22.89	22.89
MM		399.06	548.61	581.51	581.51
AC-FT		921.	1266.	1342.	1342.
THOUS CU M		1136.	1562.	1656.	1656.

HYDROGRAPH AT STA 3 FOR PLAN 1, RTIO 1

1.	1.	2.	2.	3.	3.	3.	4.	5.	6.
6.	7.	9.	15.	25.	42.	63.	78.	78.	62.
42.	26.	16.	10.	8.	9.	13.	17.	19.	21.
25.	38.	57.	77.	90.	97.	155.	350.	700.	1264.
1966.	2470.	2458.	1946.	1291.	768.	436.	255.	152.	121.
116.	111.	107.	103.	99.	95.	91.	87.	84.	81.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2470.	1858.	639.	271.	16243.
CMS	70.	53.	18.	8.	460.
INCHES		15.71	21.60	22.89	22.89
MM		399.06	548.61	581.51	581.51
AC-FT		921.	1266.	1342.	1342.
THOUS CU M		1136.	1562.	1656.	1656.

HYDROGRAPH AT STA 3 FOR PLAN 1, RTIO 2

1.	1.	1.	2.	2.	2.	2.	3.	4.	4.
5.	5.	6.	11.	19.	31.	47.	59.	58.	47.
32.	20.	12.	8.	6.	7.	10.	12.	15.	16.
19.	28.	43.	58.	67.	73.	116.	262.	525.	948.
1475.	1852.	1844.	1459.	969.	576.	327.	191.	114.	91.

Sheet 14 of 23

F7.	F4.	F0.	77.	74.	71.	69.	66.	63.	60.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1852.	1395.	479.	203.	12183.
CMS	52.	39.	14.	6.	345.
INCHES		11.78	16.20	17.17	17.17
MM		299.30	411.66	436.14	436.14

					327.	191.	114.	91.	
87.	84.	80.	77.	74.	71.	68.	66.	63.	60.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1852.	1393.	479.	203.	12183.
CMS	52.	39.	14.	6.	345.
INCHES		11.79	16.20	17.17	17.17
MM		299.30	411.46	436.14	436.14
AC-FT		691.	950.	1007.	1007.
THOUS CU M		852.	1172.	1242.	1242.

HYDROGRAPH AT STA 3 FOR PLAN 1, RTIO 3

1.	1.	1.	1.	1.	1.	2.	2.	2.	3.
3.	3.	4.	7.	13.	21.	31.	39.	39.	31.
21.	13.	8.	5.	4.	5.	6.	8.	10.	10.
13.	19.	29.	38.	45.	49.	77.	175.	350.	632.
983.	1235.	1229.	973.	646.	384.	218.	127.	76.	60.
56.	56.	54.	51.	49.	47.	45.	44.	42.	40.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1235.	929.	319.	135.	8122.
CMS	35.	26.	9.	4.	230.
INCHES		7.86	10.80	11.45	11.45
MM		199.53	274.30	290.76	290.76
AC-FT		461.	633.	671.	671.
THOUS CU M		568.	781.	828.	828.

HYDROGRAPH AT STA 3 FOR PLAN 1, RTIO 4

0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
2.	2.	2.	4.	6.	10.	16.	20.	19.	16.
11.	7.	4.	3.	2.	2.	3.	4.	5.	5.
6.	9.	14.	19.	22.	24.	39.	87.	175.	316.
492.	617.	615.	486.	323.	192.	109.	64.	38.	30.
29.	28.	27.	26.	25.	24.	23.	22.	21.	20.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	617.	464.	160.	68.	4061.
CMS	17.	13.	5.	2.	115.
INCHES		3.93	5.40	5.72	5.72
MM		99.77	137.15	145.38	145.38
AC-FT		230.	317.	336.	336.
THOUS CU M		284.	391.	414.	414.

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COMBINE HYDROGRAPHS

5 COMBINE 2 HYDROGRAPHS

ISTAQ	ICOMP	ICON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	2	0	0	0	0	1	0	0

Sheet 15 of 23

SUM OF 2 HYDROGRAPHS AT 3 PLAN 1 RTIO 1

1.	2.	3.	4.	4.	5.	6.	7.	8.	10.
12.	13.	16.	23.	36.	55.	81.	102.	112.	110.
105.	104.	113.	120.	127.	133.	139.	145.	150.	153.
161.	177.	200.	227.	252.	277.	356.	571.	951.	1553.
2269.	2564.	13382.	16115.	16665.	15221.	12550.	9822.	7576.	5961.
4754.	3904.	3226.	2718.	2333.	2003.	1742.	1518.	1327.	1152.

SUM OF 2 HYDROGRAPHS AT 3 PLAN 1 RTIO 1

1.	2.	3.	4.	4.	5.	6.	7.	8.	10.
12.	13.	16.	23.	36.	55.	91.	102.	112.	110.
105.	104.	113.	170.	127.	133.	139.	145.	150.	153.
161.	177.	203.	227.	252.	277.	356.	571.	951.	1553.
2284.	8544.	13382.	16115.	16665.	15221.	12550.	9822.	7576.	5961.
4756.	3904.	3226.	2718.	2333.	2003.	1742.	1518.	1327.	1152.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	16665.	13854.	5659.	2315.	138871.
CMS	472.	392.	160.	66.	3932.
INCHES		11.82	19.32	19.75	19.75
MM		300.32	490.68	501.72	501.72
AC-FT		6870.	11225.	11477.	11477.
THOUS CU M		8474.	13845.	14157.	14157.

SUM OF 2 HYDROGRAPHS AT 3 PLAN 1 RTIO 2

1.	2.	2.	3.	3.	4.	4.	5.	6.	8.
9.	10.	17.	19.	77.	41.	60.	77.	84.	83.
79.	77.	75.	80.	83.	89.	94.	99.	103.	106.
112.	125.	143.	163.	193.	201.	762.	431.	727.	1196.
1771.	3436.	5989.	12038.	12488.	11447.	9467.	7425.	5734.	4512.
3602.	2955.	2444.	2059.	1767.	1518.	1320.	1152.	1008.	876.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12488.	10137.	4136.	1590.	101424.
CMS	354.	287.	117.	45.	2872.
INCHES		8.65	14.12	14.43	14.43
MM		219.75	358.58	366.43	366.43
AC-FT		5027.	8203.	8382.	8382.
THOUS CU M		6201.	10118.	10339.	10339.

SUM OF 2 HYDROGRAPHS AT 3 PLAN 1 RTIO 3

1.	1.	1.	2.	2.	2.	3.	3.	4.	5.
6.	7.	8.	12.	18.	28.	40.	51.	56.	55.
52.	51.	52.	53.	55.	57.	60.	63.	65.	67.
70.	78.	89.	101.	112.	121.	161.	275.	474.	804.
1226.	1534.	3291.	8170.	8260.	7664.	6366.	5012.	3879.	3054.
2441.	2002.	1657.	1396.	1198.	1031.	897.	784.	688.	601.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8260.	6509.	2609.	1067.	64015.
CMS	234.	184.	74.	30.	1813.
INCHES		5.56	8.91	9.11	9.11
MM		141.11	226.25	231.27	231.27
AC-FT		3728.	5176.	5790.	5290.
THOUS CU M		3981.	6384.	6526.	6526.

SUM OF 2 HYDROGRAPHS AT 3 PLAN 1 RTIO 4

0.	1.	1.	1.	1.	1.	1.	2.	2.	3.
3.	3.	4.	6.	9.	14.	20.	26.	28.	28.

Sheet 16 of 23

24.	24.	24.	27.	27.	29.	29.	31.	33.	33.
35.	39.	45.	51.	56.	61.	79.	132.	727.	383.
602.	811.	896.	792.	2281.	3896.	3236.	2571.	2001.	1580.
1266.	1059.	863.	729.	627.	545.	476.	421.	377.	346.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3896.	2529.	1045.	446.	26230.

3.	3.	4.	6.	9.	14.	20.	26.	28.	28.
26.	26.	26.	27.	27.	29.	30.	31.	33.	33.
35.	39.	45.	51.	56.	61.	79.	132.	227.	383.
602.	811.	894.	797.	2281.	3496.	3236.	2571.	2001.	1580.
1266.	1039.	863.	729.	627.	543.	476.	421.	377.	346.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3496.	2529.	1085.	446.	26730.
CMS	110.	72.	31.	13.	757.
INCHES		2.16	3.70	3.80	3.80
MM		54.82	94.06	96.57	96.57
AC-FT		1254.	2152.	2209.	2209.
THOUS CU M		1547.	2654.	2725.	2725.

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HYDROGRAPH ROUTING

6 SOUTH POND ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	83.	-1

STAGE	12.00	13.00	14.00	15.75	20.00	25.00
FLOW	0.00	74.00	230.00	600.00	1860.00	3850.00
CAPACITY=	83.	305.	560.			
ELEVATION=	12.	20.	25.			

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
15.8	3.1	1.5	PRO.

STATION 6, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	1.	1.	1.	2.	2.	3.	4.	4.	5.
6.	8.	9.	11.	15.	21.	30.	42.	55.	66.
75.	84.	95.	103.	111.	118.	125.	131.	137.	143.
148.	156.	168.	185.	206.	228.	269.	362.	553.	1494.
2195.	7817.	13496.	15774.	16898.	15156.	12848.	9850.	7792.	5979.
4891.	3917.	3312.	2734.	2384.	2025.	1774.	1540.	1352.	1174.

STORAGE

Sheet 17 of 23

83.	83.	83.	85.	87.	84.	84.	84.	84.	85.
85.	85.	86.	87.	88.	90.	94.	99.	103.	108.
111.	113.	114.	116.	117.	118.	119.	121.	122.	123.
124.	125.	127.	130.	134.	138.	143.	156.	181.	200.
206.	241.	267.	276.	271.	274.	264.	251.	240.	231.
				202.	204.	202.	200.	198.	196.

STORAGE

83.	83.	83.	83.	83.	84.	84.	84.	84.	85.
85.	85.	86.	87.	88.	90.	94.	99.	103.	108.
111.	113.	114.	116.	117.	118.	119.	121.	122.	123.
144.	145.	147.	150.	154.	158.	163.	176.	181.	200.
206.	241.	267.	276.	281.	274.	264.	251.	240.	231.
224.	218.	214.	210.	207.	204.	202.	200.	198.	196.

STAGE

12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.1	12.1
12.1	12.1	12.1	12.2	12.2	12.3	12.4	12.6	12.7	12.9
13.0	13.1	13.1	13.2	13.2	13.3	13.3	13.4	13.4	13.4
13.5	13.5	13.6	13.7	13.8	14.0	14.2	14.6	15.5	16.2
16.4	17.7	18.6	19.0	19.1	18.9	18.5	18.0	17.7	17.3
17.1	16.9	16.7	16.6	16.5	16.4	16.3	16.2	16.2	16.1

PEAK OUTFLOW IS 16898. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	16898.	13834.	5630.	2292.	137497.
CMS	479.	392.	159.	65.	3893.
INCHES		11.81	19.22	19.56	19.56
MM		299.88	488.13	496.75	496.75
AC-FT		8860.	11166.	11363.	11363.
THOUS CU M		8462.	13773.	14017.	14017.

STATION 6, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	1.	1.	1.	2.	2.	3.	3.	4.
5.	6.	7.	8.	11.	16.	23.	32.	41.	50.
56.	60.	64.	67.	69.	73.	79.	85.	91.	96.
101.	108.	118.	131.	147.	164.	190.	254.	409.	801.
1879.	3095.	9460.	12232.	12261.	11726.	9437.	7666.	5743.	4658.
3618.	3038.	2466.	2107.	1786.	1552.	1338.	1176.	1027.	899.

STORAGE

83.	83.	83.	83.	83.	83.	83.	84.	84.	84.
84.	85.	85.	86.	87.	88.	91.	95.	98.	101.
104.	105.	106.	108.	109.	110.	111.	112.	113.	114.
115.	114.	118.	121.	127.	126.	131.	141.	162.	191.
203.	216.	249.	261.	261.	259.	249.	240.	229.	223.
216.	212.	208.	205.	202.	200.	198.	196.	194.	193.

STAGE

12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.1
12.1	12.1	12.1	12.1	12.1	12.2	12.3	12.4	12.6	12.7
12.8	12.8	12.9	12.9	12.9	13.0	13.0	13.1	13.1	13.1
13.2	13.2	13.3	13.4	13.5	13.6	13.7	14.1	14.8	15.9
16.3	16.7	18.0	18.4	18.4	18.3	18.0	17.7	17.3	17.1
16.8	16.7	16.5	16.4	16.3	16.2	16.1	16.1	16.0	16.0

PEAK OUTFLOW IS 12261. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12261.	10154.	4102.	1668.	100093.
CMS	347.	288.	116.	47.	2834.
INCHES		8.67	14.00	14.24	14.24
MM		220.11	355.69	361.62	361.62
AC-FT		5035.	8136.	8272.	8272.
THOUS CU M		6211.	10036.	10204.	10204.

Sheet 18 of 23

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	12261.	10154.	4102.	1668.	100093.
CMS	347.	288.	116.	47.	2834.
INCHES		8.67	14.00	14.24	14.24
MM		220.11	355.69	361.62	361.62
AC-FT		5035.	8136.	8272.	8272.
THOUS CU M		6211.	10036.	10204.	10204.

STATION 6, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	1.	1.	1.	1.	2.	2.	3.
3.	4.	5.	6.	7.	10.	15.	21.	28.	33.
37.	40.	42.	44.	46.	48.	50.	52.	55.	57.
94.	67.	86.	72.	83.	96.	113.	152.	238.	430.
913.	1650.	2922.	7832.	8515.	7530.	6617.	4985.	4047.	3051.
2537.	2009.	1713.	1411.	1230.	1050.	919.	803.	708.	626.

STORAGE

83.	83.	83.	83.	83.	83.	83.	83.	83.	84.
84.	84.	84.	85.	85.	87.	88.	91.	93.	95.
97.	98.	99.	99.	100.	101.	101.	102.	103.	104.
105.	106.	107.	110.	112.	114.	117.	124.	139.	164.
193.	201.	211.	241.	244.	239.	234.	225.	219.	212.
219.	204.	202.	199.	197.	195.	193.	191.	190.	188.

STAGE

12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
12.0	12.1	12.1	12.1	12.1	12.1	12.2	12.3	12.4	12.4
12.5	12.5	12.6	12.6	12.6	12.6	12.7	12.7	12.7	12.8
12.8	12.8	12.9	13.0	13.1	13.1	13.2	13.5	14.0	14.9
16.0	16.3	16.6	17.7	17.8	17.6	17.5	17.1	16.9	16.7
16.5	16.4	16.3	16.2	16.1	16.0	16.0	15.9	15.9	15.8

PEAK OUTFLOW IS 8515. AT TIME 45.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8515.	6494.	2572.	1046.	62741.
CMS	241.	184.	73.	30.	1777.
INCHES		5.54	8.78	8.92	8.92
MM		140.77	223.04	226.67	226.67
AC-FT		3220.	5102.	5185.	5185.
THOUS CU M		3972.	6293.	6396.	6396.

STATION 6, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
2.	2.	2.	3.	4.	5.	8.	11.	14.	17.
19.	20.	21.	22.	23.	24.	25.	26.	27.	28.
30.	31.	33.	36.	39.	43.	48.	60.	92.	172.
310.	499.	785.	873.	1932.	3892.	3332.	2604.	2072.	1610.

Sheet 19 of 23

1210.	1043.	893.	752.	652.	590.	551.	502.	453.	409.

STORAGE

83.	83.	83.	83.	83.	83.	83.	83.	83.	83.
83.	83.	83.	84.	84.	85.	85.	87.	88.	89.
90.	90.	91.	91.	91.	92.	92.	92.	93.	93.
94.	94.	95.	94.	97.	99.	101.	105.	114.	128.

1310.	1063.	893.	752.	652.	590.	551.	502.	453.	409.

STORAGE

83.	83.	83.	84.	84.	85.	85.	87.	88.	89.
90.	90.	91.	91.	91.	92.	92.	92.	93.	93.
94.	94.	95.	96.	97.	99.	101.	105.	114.	128.
149.	174.	191.	192.	204.	215.	214.	209.	205.	201.
178.	195.	193.	190.	188.	185.	180.	174.	168.	162.

STAGE

12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
12.0	12.0	12.0	12.0	12.0	12.1	12.1	12.1	12.2	12.2
12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.4	12.4	12.4
12.4	12.4	12.4	12.5	12.5	12.6	12.7	12.8	13.1	13.6
14.4	15.3	15.9	15.9	16.4	16.9	16.7	16.5	16.4	16.2
16.1	16.0	16.0	15.9	15.8	15.7	15.5	15.3	15.1	14.8

PEAK OUTFLOW IS 3892. AT TIME 46.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3892.	2522.	1053.	430.	25772.
CMS	110.	71.	30.	12.	730.
INCHES		2.15	3.59	3.67	3.67
MM		54.66	91.31	93.11	93.11
AC-FT		1250.	2089.	2130.	2130.
THOUS CU M		1542.	2576.	2627.	2627.

********** ********** ********** ********** **********

Sheet 20 of 23

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .75	RATIO 3 .50	RATIO 4 .25
HYDROGRAPH AT	1	9.80	1	15442.	11597.	7731.	3866.
		(25.38)		(437.65)(	328.38)(	218.92)(	109.46)(
ROUTED TO	3	9.80	1	15374.	11520.	7614.	3704.
		(25.38)		(435.53)(	326.20)(	215.60)(	104.89)(
HYDROGRAPH AT	3	1.10	1	2470.	1852.	1235.	617.
		(2.85)		(69.93)(	52.45)(	34.97)(	17.48)(
2 COMBINED	3	10.90	1	16665.	12488.	8260.	3896.
		(28.23)		(471.90)(	353.63)(	233.88)(	110.32)(
ROUTED TO	6	10.90	1	16698.	12261.	8515.	3892.
		(28.23)		(472.84)(	347.19)(	241.11)(	110.20)(

Sheet 21 of 23

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	29.00	29.00	34.00
	STORAGE	1400.	1400.	2300.
	OUTFLOW	0.	0.	321.

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	12.00	12.00	15.75
STORAGE	83.	83.	187.
OUTFLOW	0.	0.	600.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	15.12	3.37	281.	16898.	21.00	45.00	0.00
.75	16.43	2.68	261.	12261.	21.00	45.00	0.00
.50	17.81	2.06	244.	8515.	20.00	45.00	0.00
.25	16.88	1.13	218.	3892.	13.00	46.00	0.00

Sheet 22 of 23

Sheet 23 of 23

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  (1 APR 80
**********

RUN  DATE= 81/02/07.
     TIME= 12.25.43.
```

STABILITY ANALYSIS

APPENDIX E

TAMS

Job No. 1579-07 Sheet 1 of 9
Project NYS Dam Inspection Date 4-20-81
Subject South Pond Dam - Stability Analysis By JF
Ch'k. by JP

Assumptions

1) The Unit Weights used are as follows:
Masonry 165 lbs/ft^3
Concrete 150 lbs/ft^3

2) ICE Load of 5 kips/ft^2 acting about 1ft. from the top of the spillway section

3) Angle of Internal Resistance of granular soil foundation 30° and c = 500 psf based on engineering judgement and observations

4) Dam site is in Seismic Zone 1

5) Stability Analysis in accordance with Recommended guidelines (Ref. 10)

Loading Conditions

Case I - Normal Load; Lake at Spillway Crest ELEV 12.0. No Ice Load

Case II - Normal Load: Lake at Spillway Crest ELEV 12.0. With Ice Load

Case III - Unusual Loading; Lake level at 1/2 PMF ELEV. 17.8

Case IV - Extreme Loading; Lake level at PMF ELEV 19.1

Stability Criteria:

a) Overturning - Cases I thru IV: Resultant in Middle 1/3 of of Base.

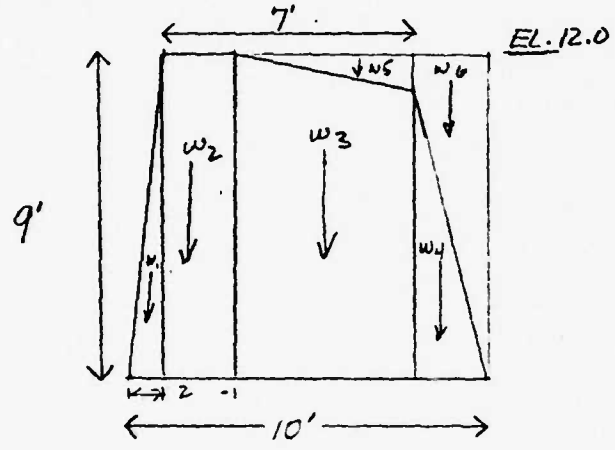
b) Sliding - Case I thru IV - Shear friction factor of safety ≥ 3
V - No analysis reqd according to guidelines —

TAMS

Job No. 1579-07 Sheet 2 of 9
Project NYS DAM INSPECTION Date 4-20-81
Subject South Pond Dam Stability Analysis By JF
Ch'k. by JP

Stability of Spillway

Dead Load



Entire Spillway Assumed to be Masonry

ΣM about Toe

	F(kips)	× MA(Ft)	= Me (Ft-kips)
$W_1 = \frac{9\times1}{2}(0.165)$	= 0.74	× 0.5	= 0.37
$W_2 = 2\times9\,(0.165)$	= 2.97	× 2.0	= 5.94
$W_3 = \frac{9+8}{2}(5)(0.165)$	= 7.01	× 5.5	= 38.57
$W_4 = \frac{8\times2}{2}(0.165)$	= 1.32	× 8.66	= 11.43
$W_5 = (5\times1)\frac{1}{2}(0.0624)$	= 0.156	× 6.34	= 0.99
$W_6 = \frac{1}{2}(9+1)(2)(0.0624)$	= 0.624	× 9.3	= 5.82
	ΣFv 12.8		ΣMe = 62.7

$$\bar{X} = \frac{62.7}{12.8} = 4.9 \text{ Ft.}$$

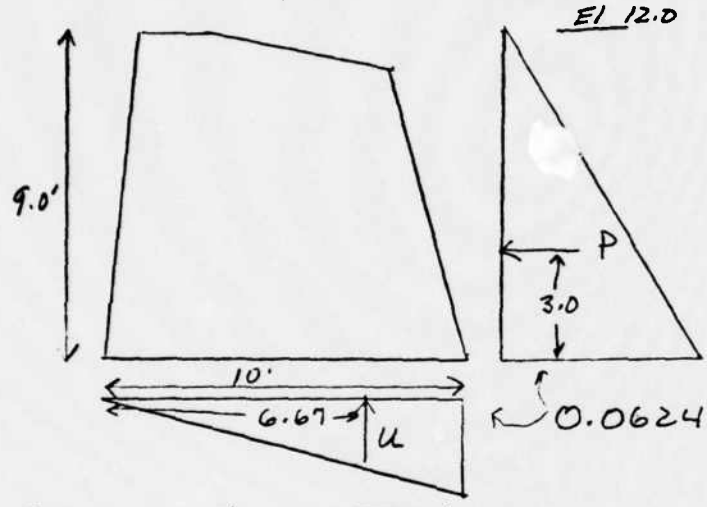
ICE LOAD

F (KIPS)	MA (Ft)	Mo
5.0 ×	8.5 =	42.5 Ft-kips

TAMS

Job No. 1579-07 Sheet 3 of 9
Project NYS Dam Inspection Date 4-20-81
Subject South Pond Dam - Stability Analysis By JF
Ch'k. by JP

Hydrostatic Forces - Normal Cases



Σ M about Toe

	F_H (kips)	F_V (kips)	x	M_A (Ft)	=	M_o (Ft-kips)
P = ½ (0.562) (9)	2.53			3.0	=	7.59
u = ½ (0.562) (10)		2.81		6.67	=	18.74
	2.53	2.81				26.33

↑ F_V = 2.81 kips
← F_H = 2.53 kips
↶ M_o 26.33 Ft-kips

TAMS

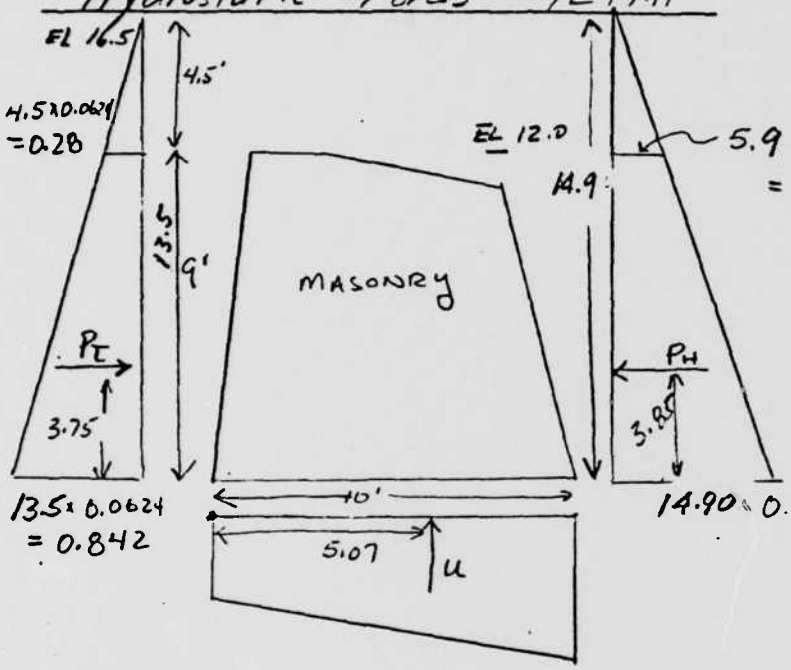
Job No. 1579-07 Sheet 4 of 9

Project NYS Dam Inspection Date 4-21-81

Subject South Pond Dam Stability Analysis By JF

Ch'k. by JP

Hydrostatic Forces - ½ PMF EL. 17.9



$P_H = \left[\frac{0.930 + 0.368}{2}\right](9)$ = F(kips) 5.8 ← × MA (ft) 3.85 = M_O (ft-kips) 22.33 M_R (ft-kips)

$P_T = \left[\frac{0.842 + 0.28}{2}\right](9)(0.6)$ = 3.0 → × 3.75 11.25

$u = \left[\frac{0.925 + 0.842}{2}\right] 10$ = 8.84 ↑ × 5.07 44.81

ΣF_H = 2.8 ← Kips

ΣF_V = 8.8 ↑ Kips

ΣM_O = 67.1 ↺ Ft-kips

ΣM_R = 11.3 ↻ Ft-kips

TAMS

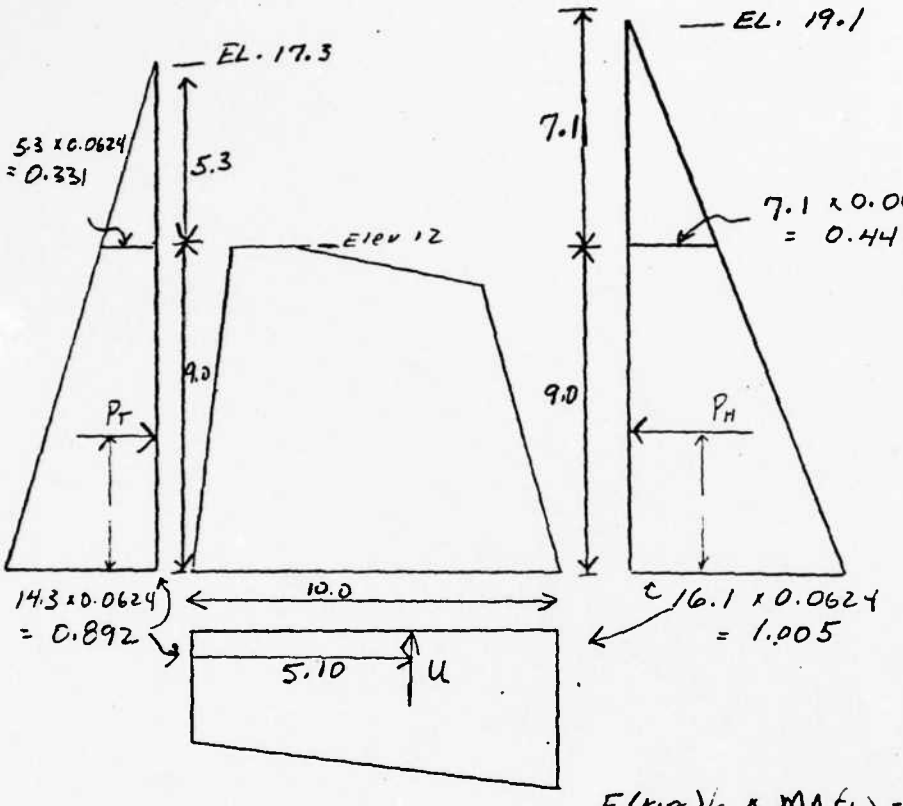
Job No. 1579-07 Sheet 5 of 9

Project NYS DAM INSP. Date 4-21-81

Subject South Pond DAM Stability Analysis By JF

Ch'k. by JP

Hydrostatic Forces - PMF



		F (kips)/ft × MA (ft) =	M_o (Ft kips/ft)	Me Ft kips/ft
$P_H = \left[\frac{1.005 + 0.443}{2}\right](9.0)$	=	6.52 ← × 3.92	25.6 ↻	
$P_T = \left[\frac{0.892 + 0.331}{2}\right](9.0)(0.6)$	=	3.30 → × 3.81		12.62
$U = \left[\frac{1.005 + 0.892}{2}\right](10.0)$	=	9.485 ↑ × 5.10	48.4 ↻	

$\Sigma F_H \leftarrow$ 3.2 kips

$\Sigma F_V \uparrow$ 9.5 kips

$\Sigma M_o \circlearrowleft$ 74.0 Ft-kips

$\Sigma M_e \circlearrowright$ 12.6 Ft-kips

TAMS

Job No. 1579-07 Sheet 6 of 9
Project NYS Dam Inspection Date 4-20-81
Subject South Pond Dam - Stability Analysis By JF
Ch'k. by JP

Case I - Normal Load - Without Ice

	F_V (Kips)	F_H (Kips)	M_R (Ft-Kips)	M_o (Ft-Kips)
Dead Load	12.8	—	62.72	
Hydrostatic	2.8	2.5		26.36
	10.0	2.5	62.72	26.36

OVERTURNING

$$\Sigma M = 62.7 - 26.3 = 36.4 \text{ Ft-kips}$$

$$\bar{N} = \frac{36.4}{10.0} = 3.6 \text{ Ft}$$

Resultant location $= 3.6 - \frac{10}{3} = +0.33$ ft inside middle third (d/s)

SLIDING:

Shear Friction Factor of Safety:

$$\frac{10 \tan 30^\circ}{2.5} + \frac{(10.0)(0.5)}{2.5} = 4.3 > 3$$

OK

TAMS

Job No. 579-07 Sheet 7 of 9
Project NYS DAM INSPECTION Date 4-20-81
Subject South Pond Dam - Stability Analysis By JF
Ch'k. by JP

Case II - Normal Load - With Ice

	F_V (kips)	F_H (kips)	M_R (ft-kips)	M_O (ft-kips)
Dead Load	12.8 ↓		62.7 ↺	
Hydrostatic	2.8 ↑	2.5 ←		26.3
Ice		5.0 ←		42.5
	10.0	7.5	62.7 ↺	68.8

OVERTURNING

$\Sigma M = 62.7 - 68.8$

$\Sigma M = -6.1$

$\bar{x} = \frac{-6.1}{10.0} = -0.6$ ft

Resultant location : $-0.6' - \frac{10}{3} = -3.93$ ft outside middle third. (d/s)

Sliding

Shear Friction Factor of Safety :

$FFS_{S\text{-}F} = \frac{10.0 \tan 30^\circ}{7.5} + \frac{(10.0)(0.5)}{7.5} = 1.47 < 3$

NG.

TAMS

Job No. 1579-07 Sheet 8 of 9
Project NYS Dam Inspection Date 4-21-81
Subject South Pond Dam - Stability Analysis By JF
Ch'k. by JP

Case III - Unusual Loading - ½ PMF

	Fv (kips/ft)	Fh (kips/ft)	Mo Ft-kips/ft	MR Ft-kips/ft
Dead Load	12.8 ↓			62.7 ↷
Hydrostatic	8.8 ↑	2.8 ←	67.1	11.1
	4.0	2.8 ←	67.1 ↶	73.8

OVERTURNING

$\Sigma M = 73.8 - 67.1 = 6.7$ Ft-kip

$\bar{x} = \frac{6.7}{4.0} = 1.7$ Ft —

Resultant location: $1.7 - \frac{10}{3} = -1.63$ ft out side middle third (d/s

Sliding

Shear Friction Factor of Safety:

$SSF_{SF} = \frac{4.0 \tan 30^\circ}{2.8} + \frac{10(0.5)}{2.8} = 2.61 < 3$

NG

TAMS

Job No. 1579-07 Sheet 9 of 9
Project NYS DAM Inspection Date 4-21-81
Subject South Pond Dam Stability Analysis By JF
Ch'k. by JP

Case IV - Extreme Loading PMF

	F_V (kips/ft)	F_H (kips/ft)	M_O (ft-kips/ft)	M_R (ft-kips/ft)
Dead Load	12.8 ↓			62.7
Hydrostatic	9.5 ↑	3.3 ←	74.0 ↶	12.6 ↷
	3.3 ↓	3.3 ←	74.0 ↶	75.3 ↷

OVERTURNING

$\Sigma M = 75.3 - 74.0 = 1.3$ Ft-kips

$\bar{x} = \frac{1.3}{3.3} = 0.4$ Ft.

Resultant location $= 0.4 - \frac{10}{3} = 2.93$ ft outside middle third (d/s)

SLIDING

Shear Friction Factor of Safety:

$$SSF_{SF} = \frac{3.3 \tan 30^\circ}{3.3} + \frac{10(0.5)}{3.3} = 2.12 < 3$$

NG

REFERENCES

APPENDIX F

References

1. "Summary of the Hydrologic Situation on Long Island, New York, as a Guide to Water-Management Alternatives", U. S. Geological Survey Professional Paper 627-F, 1972.

2. "Seasonal Variation of the Probably Maximum Precipitation, East of the 105th Meridian for Areas from 10 to 1,000 Square Miles, and Durations of 6, 12, 24, and 48 Hours", Hydrometeorological Report No. 33. Weather Bureau, U. S. Department of Commerce, April 1956.

3. "Effects of Urban Development on Direct Runoff to East Meadow Brook, Nassua Coutny, Long Usland, New York", U. S. Geological Survey Professional Paper 627-B, 1969.

4. "Flood Hydrograph Package (HEC-1) Users Manual for Dam Safety Investigations", U. S. Army Corps of Engineers, Hydrologic Engineering Center, September 1979.

5. "Lower Hudson River Basin Hydrologic Flood Routing Model", for New Yoek District Corps of Engineers, Water Resources Engineers, Inc., January 1977

6. "Standard Project Flood Determination", EM-1110-2-1411, Army Corps of Engineers, Washington, D.C., Rev. 1965

7. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian", Hydrometeorological Report No. 51, National Weather Service, June 1978.

8. "National Program of Inspection of Dams", Vol.3, Department of the Army, Office of the Chief of Engineers, 1975.

9. "Flood Hydrograph Analyses and Computations", EM-1110-2-1405, U. S. Army Corps of Engineers, August 1959

10. "Recommended Guidelines for Safety Inspection of Dams", Department of the Army, Office of the Chief of Engineers, Washington, D.C., Appendix B.

11. "Water Resources Data for New York, Vol. 1" 1979. U. S. Geological Survey Winter-Data Report NY-79-1.

12. The University of the State of New York, The State Education Department State Museum and Science Service Geological Survey - MAP and Chart Serves No. 5, Geologic MAP of New York 1961, Lower Hudson Sheet.

13. Schuberth, Christopher J., The Geology of New York City and Environ., a968, The Natural History Press, N.Y.

OTHER DATA

APPENDIX G

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
22	30	01	00192	04/17/71	03	2

AS BUILT INFORMATION

1 Location of Sp'way and outlet	1 Elevations
1 Size of Sp'way and Outlet	1 Geometry of Non-overflow section

1 GENERAL CONDITION OF NON-OVERFLOW SECTION

2 Settlement	2 Cracks	1 Deflections
2 Joints	2 Surface of Concrete	1 Leakage
1 Undermining	1 Settlement of Embankment	2 Crest of Dam
2 Downstream Slope TREES	2 Upstream Slope	2 Toe of Slope

1 GENERAL COND. OF SP'WAY AND OUTLET WORKS

4 Auxiliary Spillway	1 Service or Concrete Sp'way	1 Stilling Basin
2 Joints	2 Surface of Concrete	1 Spillway Toe
1 Mechanical Equipment	1 Plunge Pool	1 Drain

1 Maintenance	2 Hazard Class
3 Evaluation	21 Inspector

COMMENTS:

TREES & BRUSH GROWING ON EMBANKM...

Form IW31. 11-6-14-1000 (16-1138) 192 L1 Acc. 382

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

DAM REPORT

June 4 1917
(Date)

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Hempstead Pond Dam.

This dam is situated upon the [illegible] (Give name of stream) in the Town of Hempstead, [illegible] County, about two miles (State distance) from the Village or City of Hempstead [illegible]

The distance down (~~Up or~~ down) stream from the dam, to the Hempstead [illegible] (Give name of [illegible]) is about 100 ft (State distance)

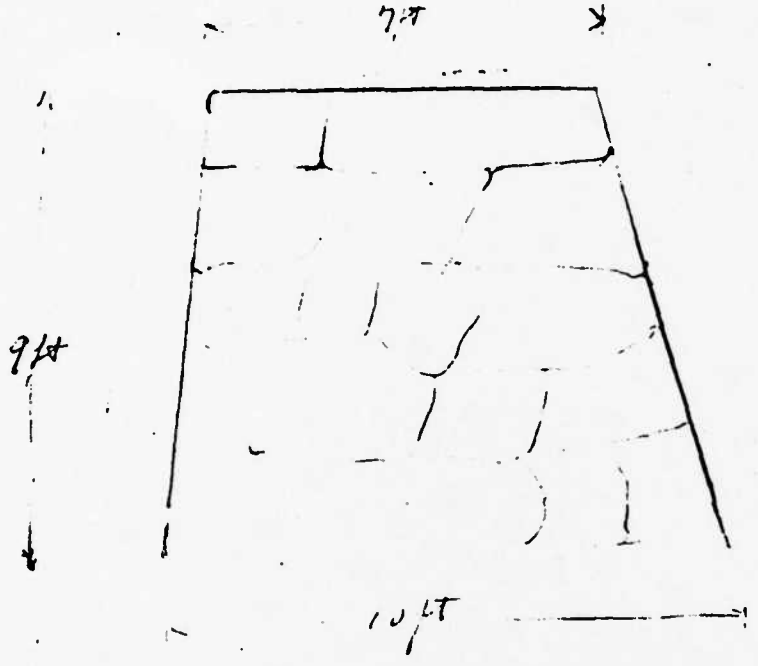
The dam is now owned by [illegible] (Give name and address in full) and was built in or about the year 1810, and was extensively repaired or reconstructed during the ~~year~~

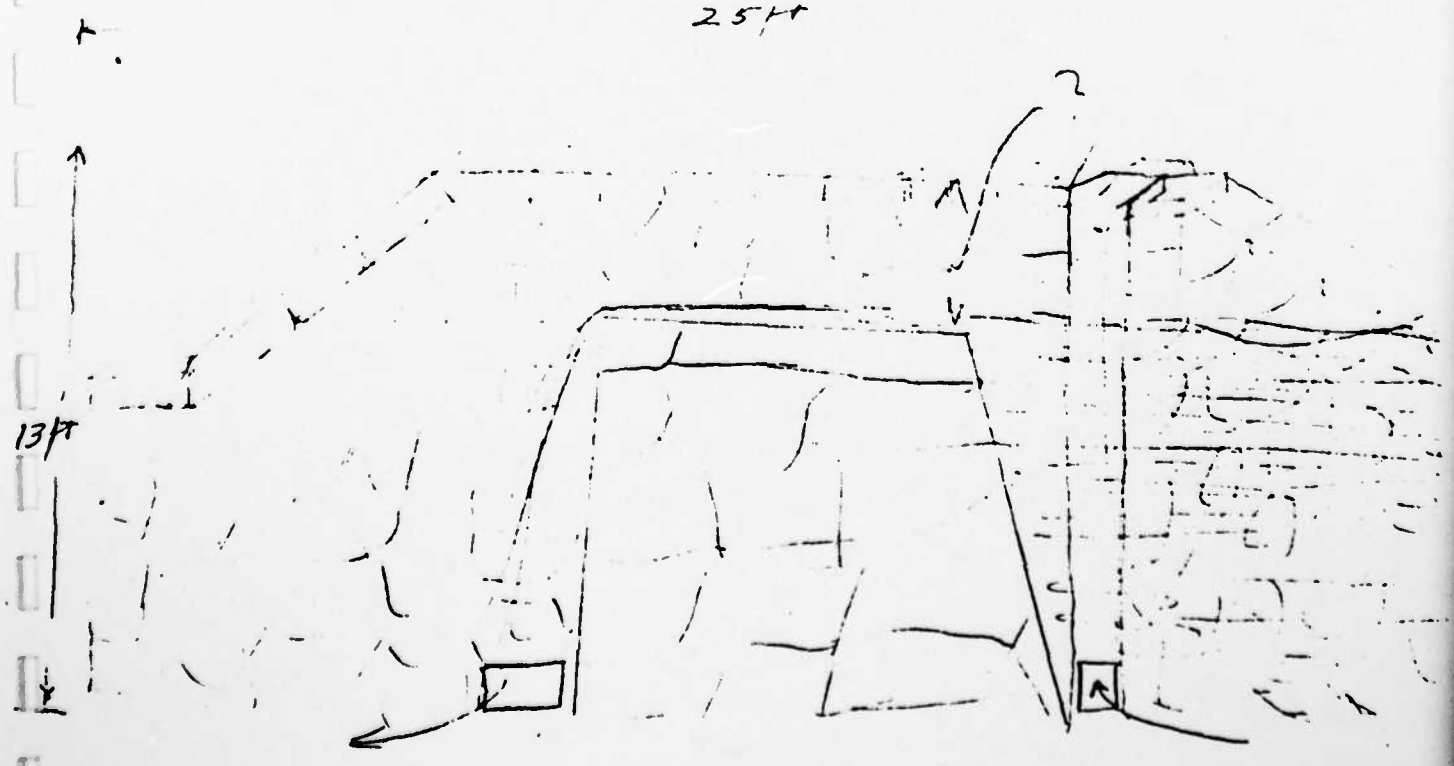
As it now stands, the spillway portion of this dam is built of [illegible] (State whether of [illegible])

and the other portions are built of [illegible] (State whether of masonry, concrete, earth or timber with or [illegible])

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is [illegible] and under the remaining portions such foundation bed is " "

(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)





(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)

Hemstead Reservoir Dyke + Filtration Beds

Lake View Ave
to Rockville Centre

The total length of this dam is 250 feet. The spillway or waste-weir portion, is about 25 feet long, and the crest of the spillway is about 4' feet below the top of the dam.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: Two hand gates each 1'x2'. Operating wheels one on each side of spillway.

At the time of this inspection the water level above the dam was — ft. 2½ in. ~~below~~ above the crest of the spillway.

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

This dam is in good condition. No leaks were apparent.

Reported by Vincent Nalbit
(Signature)

P.O.B. 177
(Address—Street and number, P. O. Box or R. F. D. route)

Port Chester N.Y.
(Name of place)


ATE
LME